NASA SP-7011(211)

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Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

NASA SP-7011(211)
October 1980

(NASA-SP-7011(211)) AEROSPACE MEDICINE AND BIOLOGY: A CONTINUING BIBLIOGRAPHY WITH INDEXES, SUPPLEMENT 211, OCTOBER 1980 (National Aeronautics and Space Administration) 76 p HC $7.00 CSCL 06E 00/52

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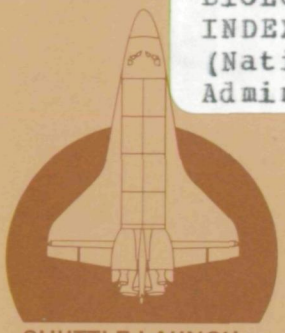

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Aerospace Medicine and Biology
A Continuing Bibliography with Indexes

Pages 185 - 215

October 1980

ACCESSION NUMBER RANGES

Accession numbers cited in this Supplement fall within the following ranges.

STAR (N-10000 Series)	N80-26264 – N80-28294
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NASA SP-7011(211)

AEROSPACE MEDICINE AND BIOLOGY

A CONTINUING BIBLIOGRAPHY WITH INDEXES

(Supplement 211)

A selection of annotated references to unclassified reports and journal articles that were introduced into the NASA scientific and technical information system and announced in September 1980 in

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INTRODUCTION

This Supplement to *Aerospace Medicine and Biology* (NASA SP-7011) lists 212 reports, articles and other documents announced during September 1980 in *Scientific and Technical Aerospace Reports (STAR)* or in *International Aerospace Abstracts (IAA)*. The first issue of the bibliography was published in July 1964; since that time, monthly supplements have been issued.

In its subject coverage, *Aerospace Medicine and Biology* concentrates on the biological, physiological, psychological, and environmental effects to which man is subjected during and following simulated or actual flight in the earth's atmosphere or in interplanetary space. References describing similar effects of biological organisms of lower order are also included. Such related topics as sanitary problems, pharmacology, toxicology, safety and survival, life support systems, exobiology, and personnel factors receive appropriate attention. In general, emphasis is placed on applied research, but references to fundamental studies and theoretical principles related to experimental development also qualify for inclusion.

Each entry in the bibliography consists of a bibliographic citation accompanied in most cases by an abstract. The listing of the entries is arranged in two major sections: *IAA Entries* and *STAR Entries*, in that order. The citations, and abstracts when available, are reproduced exactly as they appeared originally in *IAA* or *STAR*, including the original accession numbers from the respective announcement journals. This procedure, which saves time and money, accounts for the slight variation in citation appearances.

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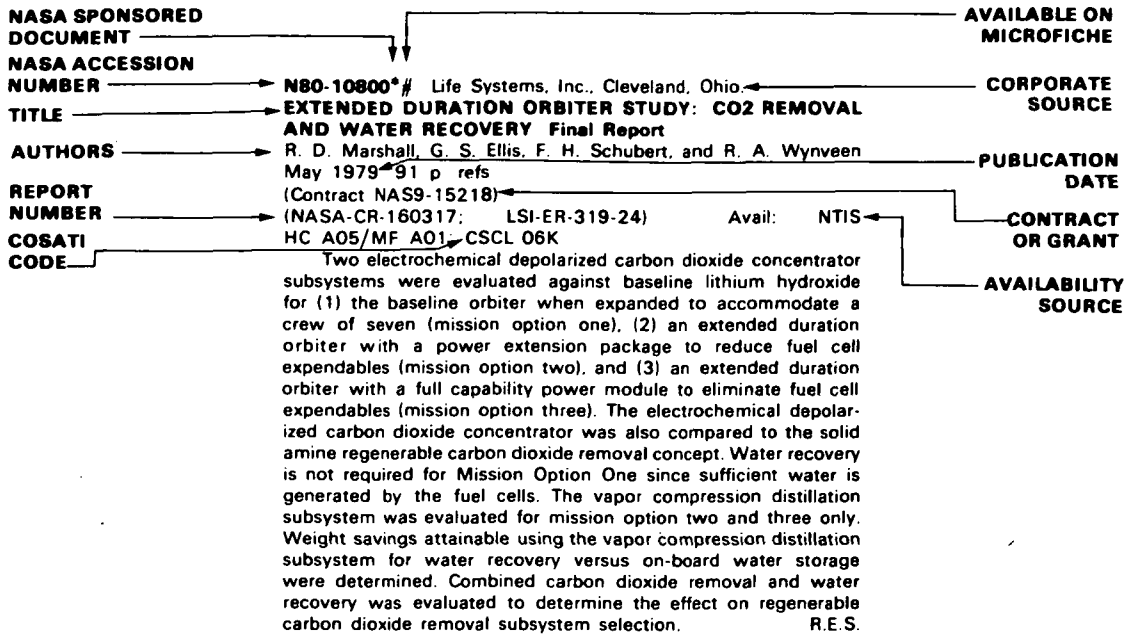

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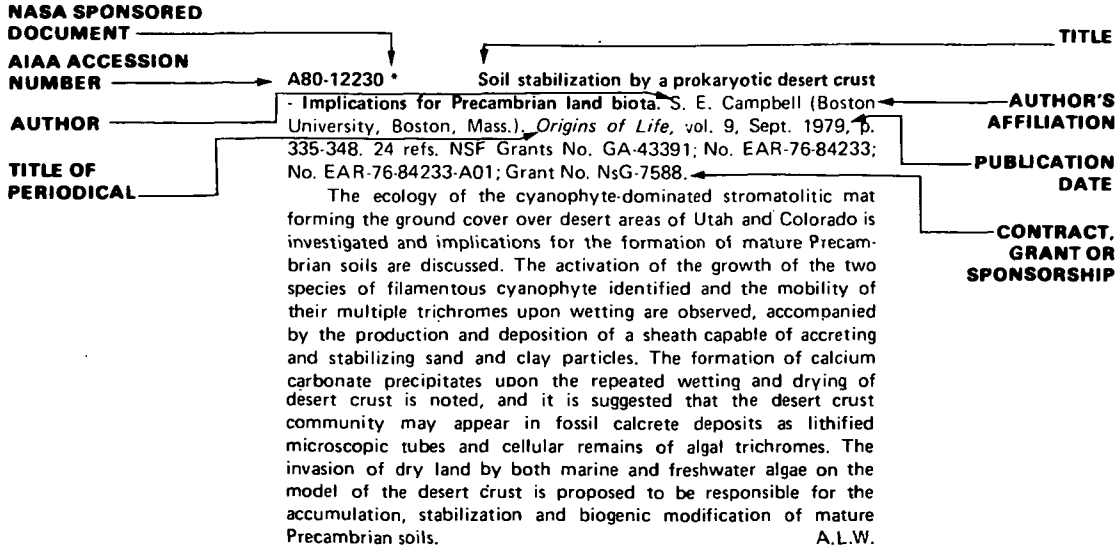

AEROSPACE MEDICINE AND BIOLOGY

A Continuing Bibliography (Suppl. 211)

OCTOBER 1980

IAA ENTRIES

A80-40546 **Electrocardiographic exercise testing and ambulatory monitoring to identify patients with ischemic heart disease at high risk of sudden death.** L. A. Ivanova, N. A. Mazur, T. M. Smirnova, A. B. Sumarokov, V. A. Nazarenko, and E. A. Svet (Akademiia Meditsinskikh Nauk SSSR, Moscow, USSR). *American Journal of Cardiology*, vol. 45, June 1980, p. 1132-1138. 22 refs.

The prognostic significance of electrocardiographic exercise testing and ambulatory monitoring in the identification of high risks of sudden death in ischemic heart disease patients is investigated. Holter monitoring and exercise stress testing were performed within a five-day interval on 144 men with established heart disease three months or longer after a definite or probable myocardial infarction. Within a follow-up period of two years following the electrocardiographic testing, 10 sudden deaths among the patients were reported, and it is found that these deaths were associated with reduced maximal exercise heart rate, exercise-induced frequent ventricular arrhythmias and complex ventricular arrhythmias on 24-hr recordings, with the presence of bivariate and trivariate factors leading to an up to 20-fold increase in the incidence of sudden death. The use of inclusive disjunction techniques for the analysis of test parameters is found to allow for the identification of high-risk subgroups. It is also noted that combinations of exercise variables identified patients at very high risk, while bivariates and trivariates were preferable for determining very low risk subgroups. A.L.W.

A80-40547 **Diagnosis of coronary artery disease with exercise radionuclide imaging - State of the art.** L. C. Becker (Johns Hopkins Medical Institutions, Baltimore, Md.). *American Journal of Cardiology*, vol. 45, June 1980, p. 1301-1304. 29 refs.

The ability of techniques of exercise radionuclide perfusion imaging at its present state of development to aid in the diagnosis of coronary artery disease is assessed. The sensitivity and specificity of exercise scintigraphy by both thallium-201 tracing and radionuclide ventrilography reported by published studies is shown to depend on the criteria used in defining an abnormal test, patient selection, the extent of disease and patient responses to exercise, and the tendency of stress thallium imaging to underestimate the extent of disease is pointed out. The two currently practiced methods of exercise scintigraphy are compared, noting the lack of conclusive evidence for the superiority of either one and the technical difficulties of exercise ventriculography. In light of the capabilities, expense and radiation exposure of the techniques, it is recommended that in most cases exercise scintigraphy should not be used as an initial screening examination, but be reserved for those patients whose diagnosis is still in doubt after standard multistage exercise testing, as well as in certain other clinical situations. The expected future improvement of exercise scintigraphy is also noted. A.L.W.

A80-40625 * **Scale effects in the musculoskeletal system, viscera and skin of small terrestrial mammals.** N. Pace, D. F. Rahlmann, and A. H. Smith (California, University, Berkeley and Davis, Calif.). *Physiologist*, vol. 22, no. 6, 1979, p. S-51, S-52. 7 refs. Grant No. NsG-7336.

A80-40846 **Imitation of locomotion under conditions of weightlessness.** V. V. Beletskii and N. S. Konikova. *(Akademiia Nauk SSSR, Izvestiia, Mekhanika Tverdogo Tela*, Sept.-Oct. 1979, p. 48-53.) *Mechanics of Solids*, vol. 14, no. 5, 1979, p. 41-45. Translation.

The analysis deals with the plane motions of a dynamic biped walking machine consisting of 5 inertial elements: a balancer-body and two identical two-link legs. It is shown that simulation of biped walking under zero-g conditions requires appreciably smaller control moments than in the presence of a gravitational field. V.P.

A80-40898 * **Dynamic decisions and work load in multitask supervisory control.** M. K. Tulga (Commercial Information Corp., Woburn, Mass.) and T. B. Sheridan (MIT, Cambridge, Mass.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-10, May 1980, p. 217-232. 38 refs. Grant No. NsG-2118.

A paradigm is developed for the problem of allocating in time a single resource to multiple simultaneous task demands which appear randomly, last for various periods, and offer varying rewards for service. Based upon a dynamic optimizing algorithm plus an estimator, and including response time and future discounting constraints, a model of the human decisionmaker is compared to experimental results for human subjects performing such a task at a computer-graphics terminal. Results indicate a reasonable fit, under various model parameters and task conditions, and suggest interesting hypotheses about the nature of human 'planning ahead' and mental work load. (Author)

A80-40899 * **Optimal control model predictions of system performance and attention allocation and their experimental validation in a display design study.** G. Johannsen and T. Govindaraj (Purdue University, Lafayette, Ind.). *IEEE Transactions on Systems, Man, and Cybernetics*, vol. SMC-10, May 1980, p. 249-261. 25 refs. Grant No. NsG-2119.

The influence of different types of predictor displays in a longitudinal vertical takeoff and landing (VTOL) hover task is analyzed in a theoretical study. Several cases with differing amounts of predictive and rate information are compared. The optimal control model of the human operator is used to estimate human and system performance in terms of root-mean-square (rms) values and to compute optimized attention allocation. The only part of the model which is varied to predict these data is the observation matrix. Typical cases are selected for a subsequent experimental validation. The rms values as well as eye-movement data are recorded. The results agree favorably with those of the theoretical study in terms of relative differences. Better matching is achieved by revised model input data. (Author)

A80-40978 **Air traffic control stress and its effects - An investigation at Manchester airport.** V. B. Maxwell and J. H. Crump (University of Manchester Institute of Science and Technology, Manchester, England). *The Controller*, vol. 19, June 1980, p. 31-33.

Air traffic control (ATC) stress research is surveyed along with the effects of the work itself, shift work, environment, interpersonal relationships and individual characteristics. The most consistent predictor of ATC stress has been found to be the number of aircraft controlled, and findings reveal that cardiovascular and psychiatric disorders are the two most prevalent medical disorders among air traffic controllers and that both exceed general population norms.

Attention is also given to a study of Manchester controllers regarding psychological screening for stress and an improved and more sophisticated medical screening which takes account of coronary heart disease risk indicators. J.P.B.

A80-41002 **Comets - A matter of life and death /Milne Lecture/.** F. Hoyle. *Vistas in Astronomy,* vol. 24, pt. 2, 1980, p. 123-139.

It is argued that comets originating during the formation of the planets Uranus and Neptune were responsible for the origin of life on earth and continue to bring new viruses and bacteria. Evidence for the existence of organic molecules within interstellar gas clouds is presented, and difficulties with the currently accepted theory of the emergence of organic compounds from inorganics in the primitive earth environment are pointed out. It is then proposed that interstellar organic compounds could have been swept up by planetesimals in the formation of Uranus and Neptune long after the earth had formed, with the gravitational generation of a halo of bodies surrounding the forming planets, inside which favorable conditions for chemical evolution would be present. Such planetesimals could then be deflected into cometary earth-crossing orbits and release evolved forms of life into the terrestrial atmosphere, where they would have evolved the capacity for photosynthesis. Evidence of the continued arrival of life forms in the form of rapidly spread and patchily distributed viral and bacterial diseases is presented, and it is contended that terrestrial organisms have not evolved an absolute immunity to all virus infections due to the fact that these viruses, most likely of cometary origin, are the source of genetic variability. A.L.W.

A80-41051 # **An analytical evaluation method of manual control system utilizing human pilot model.** K. Tanaka (National Aerospace Laboratory, Chofu, Tokyo, Japan). *Japan Society for Aeronautical and Space Sciences, Transactions,* vol. 23, May 1980, p. 35-50. 16 refs.

The paper examines an analytical evaluation method of a manual control system which consists of an aircraft and a human pilot. The method is based on the assumptions that the control mission determines the critical frequency observed in the pilot, and that the degree of closed-loop stability and human compensation necessary to attain stability determine the human subjective evaluation of the system. A simple evaluation chart is presented based on experimental data on human compensatory dynamics which can explain almost all of the experimental results. The method has advantages of simplicity in the sense of requiring only two typical controlled element parameters to be evaluated, applicability to unstable controlled elements, predictability of controllability limits of manual control, and the possibility of estimating human compensatory dynamics. A.T.

A80-41139 **Brightness exponent as a function of retinal eccentricity in the peripheral visual field - Effects of dark and light adaptation.** N. Osaka (Ottemon Gakuin University, Ibaraki, Osaka, Japan). *Perception and Psychophysics,* vol. 27, no. 6, June 1980, p. 519-523. 28 refs.

Using a method of direct magnitude estimation, the exponent of the brightness power function was determined under dark and light adaptation at luminance levels well above threshold. The exponent was estimated for functions describing the brightness of stimuli presented at the fovea and the following peripheral retinal loci: 10, 20, 30, 40, and 50 deg nasally eccentric to the fovea along the horizontal meridian of the right eye. The exponent for a 1-sec flash was found to be approximately .33 at the fovea and increased slightly with increasing retinal eccentricity. The effect of adaptation on the brightness exponent was not so large when the target luminance was set well above threshold. (Author)

A80-41250 * **The intracellular Na/+/ and K/+/ composition of the moderately halophilic bacterium, Paracoccus halodenitrificans.** M. Sadler, M. McAninch, L. I. Hochstein (NASA, Ames Research Center, Extraterrestrial Research Div., Moffett Field, Calif.), and R. Alico. *Canadian Journal of Microbiology,* vol. 26, no. 4, 1980, p. 496-502. 24 refs.

A80-41318 # **Review - The role of pulse oscillations of intravascular pressure in the regulation of blood circulation (Obzor - Rol' pul'sovykh kolebanii vnutrisosudistogo davleniia v reguliatsii krovoobrashcheniia).** L. I. Osadchii and A. P. Pugovkin (Akademiia Nauk SSSR, Institut Fiziologii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 66, May 1980, p. 617-628. 80 refs. In Russian.

Current understandings of the role of blood pressure oscillations due to the pulsed operation of the circulatory system in the regulation of blood circulation are reviewed. Attention is given to experimental results concerning systemic and organ-level hemodynamic reactions to the alternation of pulsating and nonpulsating perfusate blood flows, and variations in tissue metabolism during pulsating and nonpulsating perfusion, and it is pointed out on the basis of these results that whereas any method of artificial blood circulation causes the destruction of microcirculation as well as tissue hypoxia and metabolic acidosis, nonpulsating perfusion in general leads to more serious damage to capillary transport. Mechanisms for the influence of pulse oscillations on vascular tension are then examined, and areas requiring further investigation are indicated. A.L.W.

A80-41319 # **The organization of the sleep-wakefulness cycle according to data obtained by the continuous daily monitoring of heart rhythm and motor activity (Ob organizatsii tsikla 'bodrstvovanie-son', po dannym sutochnoi nepreryvnoi registratsii serdechnogoritma i dvigatel'noi aktivnosti).** A. I. Belich (Akademiia Nauk SSSR, Institut Evoliutsionnoi Fiziologii i Biokhimii, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 66, May 1980, p. 642-649. 22 refs. In Russian.

The daily variations in wakefulness and rest periods in the pond turtle Emys orbicularis are investigated by the contactless monitoring of heart rhythm and motor activity in order to determine the temporal structure of the sleep-wakefulness cycle. Results indicate a pronounced slowing of heart rate upon the transition from a state of wakefulness to various levels of sleep, in agreement with the universally observed slowing with increasing depth of sleep-like rest periods. A five-stage characteristic sleep-wakefulness cycle consisting of periods of active and passive waking, daytime rest (cataleptic motionlessness), nighttime rest (catatonic) and rest with relaxed skeletal muscles (intermediate sleep) is determined, with phased autonomic and motor phenomena noted during the stage of intermediate sleep. A.L.W.

A80-41320 # **Respiration and oxidative phosphorylation in the mitochondria of brain and heart tissues during circulatory brain hypoxia and in the post-hypoxic period (Dykhanie i okislitel'noe fosforilirovanie mitokhondrii tkanei mozga i serdtsa pri tsirkuliatornoi gipoksii mozga i v postgipoksicheskom periode).** A. I. Kolotilova, L. V. Govorova, G. V. Kudriavtseva, L. Khari, S. A. Makarov, Iu. M. Malyshev, and S. I. Teplov (Leningradskii Gosudarstvennyi Universitet; Leningradskii Neirokhirurgicheskii Institut, Leningrad, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 66, May 1980, p. 687-694. 15 refs. In Russian.

A80-41321 # **Changes in the adrenergic regulation of thermogenesis during the long-term adaptation of rats to the cold (Izmeneniia adrenergicheskoi reguliatsii termogeneza pri dolgovremennoi adaptatsii krys k kholodu).** Iu. F. Pastukhov (Akademiia Nauk SSSR, Institut Biologicheskikh Problem Severa. Magadan, USSR). *Fiziologicheskii Zhurnal SSSR,* vol. 66, May 1980, p. 739-745. 16 refs. In Russian.

A80-41645 **A technique for estimating the contribution of photomechanical responses to visual adaptation.** M. V. Srinivasan and G. D. Bernard (Yale University, New Haven, Conn.). *Vision*

Research, vol. 20, no. 6, 1980, p. 511-521. 29 refs. Research supported by the Connecticut Lions Eye Research Foundation; Grants No. NIH-EY-01140; No. NIH-EY-00785.

This paper presents a technique for isolating and quantifying the contribution of photomechanical responses to visual adaptation. The technique is developed in the context of the pupillary mechanism that is active in the primary visual cells of the insect eye. Using a feedback-control model to represent the combination of retinular cell and pupil, it is shown that the effect of pupillary movements on retinal illumination can be inferred by analysing an intensity response function of the pupil. When the technique is applied to the pupils of the butterfly and the fly, the results indicate that in each case, the pupil decreases retinal illumination by approximately 0.7 log units when the ambient light level is increased from pupillary threshold to a level 2.5 log units higher. The validity of the technique is examined by applying it to the human pupil. The results predict changes of retinal illumination which are in close agreement with those expected on the basis of changes in iris diameter, including the Stiles-Crawford effect. The procedure presented here is simple and can, in principle, be applied to many forms of photomechanical adaptation. (Author)

A80-41646 **Target position and velocity - The stimuli for smooth pursuit eye movements.** J. Pola and H. J. Wyatt (New York, State University, New York, N.Y.). *Vision Research*, vol. 20, no. 6, 1980, p. 523-534. 29 refs. Research supported by the State University of New York Research Foundation and New York Foundation; Grant No. NIH-EY-02878.

Smooth pursuit eye movements are usually thought to be guided only by target velocity. We studied the effectiveness of target velocity and target position (offset from the fovea) as stimuli for pursuit movements. Under open-loop conditions, we used induced (apparent) sinusoidal motion as a 'velocity-only' stimulus, and square-wave motion as a 'position-only' stimulus. Over a range of frequencies, position stimuli tended to give larger responses, and response velocity increased linearly with target offset. When open-loop sinusoidal target motion was synthesized using appropriate position-only and velocity-only 'components', the response was about the same as for real sinusoidal motion, suggesting a dominant role for target position in both cases. Using non-periodic step-ramp stimuli as devised by Rashbass, but in the open-loop, we have commonly observed position-directed pursuit movements. (Author)

A80-41661 * **Na+ and Ca2+ ingestion - Plasma volume-electrolyte distribution at rest and exercise.** J. E. Greenleaf and P. J. Brock (NASA, Ames Research Center, Biomedical Research Div., Moffett Field, Calif.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology*, vol. 48, May 1980, p. 838-847. 24 refs.

The effects of hypernatremia and hypercalcemia on plasma volume and electrolyte distribution during rest, exercise and recovery in cool and hot environments are investigated. Plasma volume, protein and electrolytes were measured in two groups of five men in the supine position during rest, exercise at 40-47% maximal oxygen consumption and recovery in 26.5 C and 39.4 C environments, after ingestion in the rest period of 16-17 ml/kg hypertonic NaCl, isotonic NaCl or hypertonic calcium gluconate solutions. During the rest period, it is found that the hypertonic Ca drink prevents any rise in plasma volume in both cool and hot environments, while hypertonic Na retarded hypervolemia only in the cool environment and consumption of both isotonic and hypertonic Na in the heat resulted in a hypervolemic response twice as great as that in the cool environment. During exercise and recovery, plasma volume is found to be greatest after drinking hypertonic Na in the heat, while the normal hypervolemic responses during exercise were not influenced by drink composition. Results suggest that hypertonic drinks may be better for maintaining plasma volumes during exercise in the heat. A.L.W.

A80-41690 **Predicting the effects of vertical vibration frequency, combinations of frequencies and viewing distance on the reading of numeric displays.** C. H. Lewis and M. J. Griffin (Southampton, University, Southampton, England). *Journal of Sound and Vibration*, vol. 70, June 8, 1980, p. 355-377. 16 refs. Research supported by the Ministry of Defence (Procurement Executive).

The effects of vertical vibration frequency, viewing distance and multifrequency vibrations on the performance of a numerical reading task are investigated in order to derive frequency weighting functions for the establishment of vibration standards for vehicle design. Subjects were required to read white numerals printed on black cards when subjected to five levels of sinusoidal vibration at ten frequencies between 2.8 and 63 Hz, five levels of sinusoidal vibration at frequencies of 3.15 and 16 Hz with viewing distances from 0.75 to 3.0 m, and twelve combinations of three vibrations at various levels. Contours of vibration levels required to produce mean equal reading errors indicate the visual task to be most sensitive to vibration in the frequency range 8 to 16 Hz, with the sensitivities of individual subjects exhibiting similar trends. Increases in viewing distance from 0.75 to 1.5 m are found to result in increased relative sensitivities to higher frequencies, although the overall effect of vibration is decreased. Finally, the effects of complex vibration on performance are observed to be most accurately predicted from the most severe weighted spectral component alone. A.L.W.

A80-41750 **Space victualling.** N. W. Pirie. *Endeavour*, vol. 4, no. 2, 1980, p. 74-77. 8 refs.

The supplying of space crews with water, food and oxygen is discussed with emphasis on recycling strategies which may be used in a closed environment. The possible sources of energy in a space environment (solar, chemical, nuclear) are indicated, and the recovery and management of water is considered briefly. The photosynthetic recycling of CO2 is then discussed, with attention given to optimal environmental conditions in plant growth chambers, the relative merits of higher plants, algae and photosynthetic bacteria as CO2 sinks and food and oxygen sources and facilities for generating O2 and removing CO2 during periods of darkness such as the lunar night. The relative contributions of biological and electrical forms of material recycling in a closed environment are considered, and the possibility that edible substances may be found on a planet orbiting a star is pointed out. A.L.W.

A80-41757 # **The Shuttle's remote manipulator system - Status and operation.** C. M. Hinds (Spar Aerospace, Ltd., Toronto, Canada). *Deutsche Gesellschaft für Luft- und Raumfahrt and American Astronautical Society, Symposium on Shuttle/Spacelab - The New Transportation System and its Utilization, 3rd, Hanover, West Germany, Apr. 28-30, 1980, DGLR Paper 80-075.* 14 p.

The design and operation of the Shuttle remote manipulator system (RMS) is described, and its uses in conjunction with Spacelab experiments are reviewed along with free flying payloads. Attention is given to modes of control and RMS performance. Special facilities including system testing and simulation are outlined, and current status is discussed. V.T.

A80-41761 # **Manned maneuvering unit.** S. J. Ducsai (Martin Marietta Aerospace, Denver, Colo.). *Deutsche Gesellschaft für Luft- und Raumfahrt and American Astronautical Society, Symposium on Shuttle/Spacelab - The New Transportation System and its Utilization, 3rd, Hanover, West Germany, Apr. 28-30, 1980, DGLR Paper 80-081.* 16 p.

The development and characteristics of the Shuttle manned maneuvering unit (MMU) are described. Three generations of MMU mockups are presented. Consideration is given to MMU structure, configurations, control arm details, control electronics, and propulsion scheme. Different usages of the MMU are discussed. V.T.

A80-41876 **Performance effects of alcohol intoxication and hangover at ground level and at simulated altitude.** W. E. Collins (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 327-335. 29 refs.

Eight private pilots, four men and four women, were trained to perform on a two-dimensional tracking task (joystick control of a localizer/glideslope instrument) and to respond as quickly as possible to the onset of a red pinlight, appended to the tracking instrument, by depressing a button on the joystick. Tracking and reaction time scores were obtained under both static (stationary) and dynamic conditions (during angular acceleration), at ground level and at a simulated altitude of 3658 m. Subjects performed in the evening after a monitored dinner, drank prepared beverages from 2100 to midnight, and were tested again. Subjects slept 4-5 h, were awaken around 0645, were fed, and performed the tasks again, beginning about 0730. At midnight following alcohol ingestion (3.25 ml of 100-proof alcohol/kg body weight), peak breath alcohol levels averaged 91 mg%. Impairment in tracking performance and in visual reaction time occurred during midnight sessions following alcohol ingestion. While ratings of hangover and other questionnaire data indicate awareness of hangover symptoms, no hangover-related performance impairment was recorded during morning sessions. In addition, no significant altitude/alcohol interactions on performance were obtained during either acute intoxication or hangover periods. These results thus offer no evidence contrary to the 8-hour rule. (Author)

A80-41877 **Electroencephalographic recordings during parachute jump sessions.** P. Gauthier, L. Jouffray, M. Rodi, and C. Gottesmann (Nice, Université, Nice, France). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 336-338. 10 refs.

Electroencephalographic (EEG) recordings of experienced parachutists were done by means of telemetry before, during, and after jumps of up to 3500m. During free-fall and after stabilization, alpha rhythm was recorded from several alpha reactive subjects when they closed their eyes. No pathological EEG recordings were obtained during the different phases of the jump. (Author)

A80-41879 **Psychomotor performance during ozone exposure - Spectral and discriminant function analysis of EEG.** J. A. Gliner, S. M. Horvath, R. A. Sorich (California, University, Santa Barbara, Calif.), and J. Hanley (California, University, Santa Barbara and Los Angeles, Calif.). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 344-351. 17 refs. Research supported by the California State Air Resources Board.

Two experiments were conducted to evaluate the effects of ozone on the electroencephalogram during psychomotor performance. The first experiment consisted of a 2-h visual sustained attention task in room air and 0.75 parts per million (ppm) ozone. The second experiment was a divided attention study which combined a visual choice reaction time situation with an auditory sustained attention task. Ozone levels in this experiment were 0.0 ppm, 0.3 ppm, and 0.75 ppm. Spectral and discriminant function analyses were performed on the EEG collected during these studies. Attempts were made to categorize the EEG between different ozone levels, at rest, during each task performance, and between task and no-task performance within each ambient air condition. Discriminations between conditions for individuals were quite good, but discriminations for the combined subjects were disappointing with the exception of those between task and no-task conditions, which were moderately good. (Author)

A80-41880 **Rhesus brain gas tension and learned task performance responses to normoxic and hyperoxic breathing.** A. A. Karl, S. L. Ward, M. E. Souder, A. T. Kissen, and G. L. Causer (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB; Systems Research Laboratories, Inc., Dayton, Ohio). *(Aerospace Medical Association, Annual Meeting, 50th, Washington, D.C., May 14-17, 1979.) Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 352-355. 21 refs. Contract No. F33615-76-C-5001. (AMRL-TR-105)

The impact of extended exposure to 21 and 100% O2 breathing mixtures on brain tissue oxygenation and performance of a learned task was studied in seven rhesus monkeys. Trained in the Sidman Avoidance Task, the animals were exposed to either breathing mixture for a period of 3.5 h in which brain tissue partial pressures of O2, CO2 and N2 were observed. With 100% O2, O2 and CO2 tensions rose significantly (less than 0.01 and less than 0.05, respectively) above control levels while N2 tension fell significantly (less than 0.01) below its baseline value. With 100% O2 no statistically significant difference in gas tension values was shown for performance vs. nonperformance conditions. There was no difference in the number of shocks received with either breathing mixture. Lever press response frequency decreased throughout the experiment for both groups. During the last performance session, response frequency for the 100% O2 group leveled off, whereas for the 21% O2 group it continued to decrease. (Author)

A80-41881 **Effect of induced cyclic changes of deep body temperature on performance in a flight simulator.** T. M. Gibson, J. R. Allan, C. J. Lawson, and R. G. Green (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 356-360. 17 refs.

Previous studies have shown that performance of a simple motor task may be degraded by heating the skin when the body temperature is above a critical level of 37.6 C. The experiment reported here confirms these findings for performance in a simple flight simulator. The significance of the results is discussed with reference to flight in high-performance aircraft. (Author)

A80-41882 **Visual search performance during simulated radar observation with and without a sweepline.** R. I. Thackray and M. Touchstone (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 361-366. 17 refs.

A complex vigilance task was used to study the effect of a radar sweepline on attentional processes. The visual display was designed to approximate an automated air traffic control radar display. There were 28 men and women, half assigned to the sweep and half to the no-sweep condition, tested over a 20h session. Although the no-sweep appeared to be generally superior to the sweep condition in all measures of detection efficiency, none of the differences was significant. Measures of eye fixation paralleled the patterns of change in performance during the task session. However, as with performance, mean fixation durations for the sweep and no-sweep conditions did not differ, nor were individual differences in scanning activity related to performance. Possible reasons for the lack of relationship between scanning activity and performance are discussed. (Author)

A80-41883 **The thermal properties of a survival bag incorporating metallised plastic sheeting.** I. M. Light and J. N. Norman (Aberdeen, University, Aberdeen, Scotland). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 367-370. 23 refs.

Five male subjects were exposed to a cooling environment equivalent to 1082 W/sq m. The subjects wore a clothing assembly with insulation properties of 1.55 clo. A casualty bag incorporating metallized plastic sheeting was provided for additional insulation. Deep body temperature fell 1.2 C and mean skin temperature 2.6 C over the 2-h period. Metallized plastic sheeting did not prevent heat loss through the clothing assembly, as indicated by the falls in body and skin temperature and an increase in metabolic heat production. From measurements made during the exposure, the calculated insulation value of the complete assembly of 2.93 clo was close to the predicted value of 2.80 clo calculated from the thermal resistance

of the assembly layers. It is concluded that the metallized plastic sheeting in this casualty bag did not provide significant additional thermal insulation. (Author)

A80-41884 Effect of an altered rest-activity or feeding schedule on the shift of motor activity rhythm of mice. H. Murakami and Y. Murakami (Kobe University, Kobe, Japan). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 371-374. 11 refs.

Preflight acclimatization to the rhythm of destination and postflight daytime activity are assumed to be effective countermeasures against the jet lag syndrome. Regarding this idea, resynchronization of motor activity rhythm was investigated in mice subjected to daytime exercises on a driven belt before or after the reversal of lighting regimen. In addition, the effect of prior daytime feeding was studied. No evidence was manifested that the forced exercises or feeding schedule would hasten synchronization. This result indicates that the central control system of motor activity rhythm could not be manipulated favorably by such method in mice. On the basis of the result obtained, the applicability of countermeasures to human beings was discussed. (Author)

A80-41885 Cardiovascular responses of man exposed to plus Gz accelerations in a centrifuge. B. Vettes, H. Vieillefond, and R. Auffret (Centre d'Essais en Vol, Laboratoire de Médecine Aérospatiale, Brétigny-sur-Orge, Essonne, France). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 375-378. 13 refs. Translation.

Cardiovascular investigations were conducted in male volunteer subjects exposed to plus Gz accelerations. Electrocardiogram, blood pressure, heart rate, stroke volume, and cardiac output were recorded. Accelerations ranging from plus 1.5 Gz to plus 6 Gz were applied during periods of from 30 s to 20 min. Acceleration was achieved in 10-90 s. Heart rate markedly increased as a function of acceleration intensity, reaching 160 beats/s. Decreases in cardiac output (30-40 percent) and stroke volume were also observed. Protection by an anti-G suit reduces tachycardia. Accelerations induce various electrocardiographic disorders lasting several minutes after the stress has been stopped. These are sometimes the first symptons of functional cardiovascular failure. The centrifuge turns out to be an excellent screening tool. However, when used for testing various aircrew equipment, strict monitoring of the subjects is required. (Author)

A80-41886 Evaluation of an acute mountain sickness questionnaire - Effects of intermediate-altitude staging upon subjective symptomatology. D. A. Stamper, R. T. Sterner, and S. M. Robinson (U.S. Army, Letterman Army Institute of Research, San Francisco, Calif.; U.S. Army, Institute of Environmental Medicine, Natick, Mass.). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 379-387. 17 refs.

A80-41887 Identification of the minimum noise level capable of producing an asymptotic temporary threshold shift. M. R. Stephenson, C. W. Nixon, and D. L. Johnson (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 391-396. 9 refs. Research sponsored by the U.S. Environmental Protection Agency and U.S. Air Force. (AMRL-TR-79-106)

The present study was designed to identify the minimum noise level capable of producing an asymptotic temporary threshold shift (ATTS). It was estimated that at some level below 85 dBA, probably 70-80 dBA, there existed an exposure level at which no ATTS would occur. This level would then define an exposure condition below which personnel could be exposed for indefinite periods of time without adverse auditory effects. Subjects were exposed to continuous pink noise for 24 h at levels of 65, 70, 75, 80, and 85 dBA. TTS growth and recovery was measured at specific intervals throughout each condition. Results demonstrate that at the most sensitive frequency (4000 Hz), an ATTS threshold level would be predicted in the region of 75-80 dBA. (Author)

A80-41888 * Is the weight loss of hyperbaric habitation a disorder of osmoregulation. L. W. Raymond, N. S. Raymond, V. P. Frattiali, J. Sode, C. S. Leach, and W. H. Spaur (NASA, Johnson Space Center, Houston, Tex.; National Naval Medical Center, Bethesda, Md.; U.S. Navy, Experimental Diving Unit, Panama City, Fla.). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 397-401. 18 refs.

To examine the weight loss of hyperbaric helium-oxygen habitation, the exchange of liquids and calories was measured in six men who lived in this atmosphere for 32 d. The maximum pressure was 49.5 ATA. The men lost 3.7-10.1 kg, in spite of warm ambient (31-32 C) temperatures and adequate calories (2,737 kcal/d) provided for the sedentary ways of chamber living. Weight loss and a calculated fluid deficit were accompanied by significant hemoconcentration, shown by increases in serum proteins. These changes were followed by a rise in urinary aldosterone and vasopressin, but not thirst. Weight loss in hyperbaric atmospheres is probably multifactorial, but the data suggests an uncoupling of normal osmoregulation may have occured in the present set of subjects. This may have been due to altered lung mechanics, increased catecholamines, or effects of high pressure on cellular responses to vasopressin. (Author)

A80-41890 Minimizing the psychological effects of a wartime disaster on an individual. D. K. Kentsmith (U.S. Veterans Administration Hospital; Creighton University, Omaha; Nebraska, University, Lincoln, Neb.). *Aviation, Space, and Environmental Medicine,* vol. 51, Apr. 1980, p. 409-413. 23 refs.

In this paper, the psychological reactions of individuals and groups to a wartime disaster, such as nuclear explosion, are presented. The psychological literature on disasters is discussed. The presentation attempts to emphasize viewing the victims of a disaster as individuals responding in a normal way to an overwhelming experience rather than labeling them as psychiatric patients. The various phases of a disaster are discussed with particular emphases on the preventive measures and leadership roles which may be taken by the physician. The development and treatment of situational psychoses, as well as neurotic reactions, are examined and the dynamics especially of long-lasting neurotic problems explored. The paper concludes by making specific recommendations regarding the establishment of disaster plans and training programs at each military facility. It is suggested that the use of such plans may help minimize the psychological effects of a wartime disaster on the individual. (Author)

A80-41977 Absolute and relative work capacity in women at 758, 586, and 523 torr barometric pressure. D. S. Miles, J. A. Wagner, S. M. Horvath, and J. A. Reyburn (California, University, Santa Barbara, Calif.). *Aviation, Space, and Environmental Medicine,* vol. 51, May 1980, p. 439-444. 25 refs. Grants No. AF-AFOSR-78-3534; No. NIH-AG-00021.

The present study evaluated cardiorespiratory responses to exercise in six young women (22-34 yr) in relationship to maximal oxygen uptake at sea level and moderate altitudes. Pulmonary ventilation was consistently 10-15% higher at altitudes when expressed as a percent of maximal oxygen uptake, primarily due to an increase in respiratory rate. At altitudes down to a barometric pressure of 523 torr, the control of heart rate responses and decrements in maximal oxygen uptake in women were similar to those in males, but ventilatory control mechanisms differed. S.D.

A80-41978 Effect of direction and rate of change of deep body and skin temperatures on performance of a rotary pursuit task. T. M. Gibson, P. J. Redman, and J. R. Allan (RAF, Institute of Aviation Medicine, Farnborough, Hants., England). *Aviation, Space, and Environmental Medicine,* vol. 51, May 1980, p. 445-447. 5 refs.

Performance at a pursuit rotor task has been studied during the overshoot of core temperature caused by sudden cooling after

heating, and the undershoot caused by sudden heating after cooling. Conditions were chosen so that effects of the absolute levels of core and skin temperature could be discounted. The results showed that the direction of change of core and skin temperature, rates of change of core temperature between -0.07 and +0.06 C/min, and rates of change of skin temperature between -1.0 and +1.0 C/min did not affect performance; particular circumstances of this experiment, especially the short duration of the changes in direction studied, make this conclusion tentative. Comparison with earlier studies indicates that the major determinants of performance at elevated body temperatures are absolute levels of mean skin temperature, with the absolute level of core temperature having a less significant role. (Author)

A80-41979 Respiratory gas exchange during positive pressure breathing and rapid decompression to simulated altitudes of 18.3 and 24.4 km. D. E. Holness, J. A. G. Porlier, K. N. Ackles, and G. R. Wright (Defence and Civil Institute of Environmental Medicine, Downsview, Ontario, Canada). *Aviation, Space, and Environmental Medicine*, vol. 51, May 1980, p. 454-458.

Respiratory gas exchange was studied, using the technique of mass spectrometry, during events of slow and rapid decompression of human subjects to simulated altitudes of 60,000 and 80,000 ft (18.3 and 24.4 km, respectively). Positive breathing pressures and G-suit counterpressures were employed in three series of decompression experiment. Low levels of inspired carbon dioxide and nitrogen reflected the rebreathing of gases throughout the experiments. Application of a positive breathing pressure of 70 torr, accompanied by a jerkin pressure equal to breathing pressure and a G-suit counterpressure of four times the breathing pressure on the trunk and limbs, respectively, maintained alveolar oxygen at physiologically safe levels during decompression to 60,000 ft (18.3 km) altitude. Similarly, 80 torr positive breathing pressure, in combination with four times the breathing pressure in the G suit, adequately satisfied the requirements for oxygen during rapid decompression to 80,000 ft (24.4 km) simulated altitude. (Author)

A80-41980 Combined effect of hypoxia and cold on the phospholipid composition of lung surfactant in rats. R. Kumar, K. S. Hegde, B. Krishna, and R. S. Sharma (Defence Institute of Physiology and Allied Sciences, Delhi, India). *Aviation, Space, and Environmental Medicine*, vol. 51, May 1980, p. 459-462. 18 refs.

The phospholipid composition of lung tissue and lung lavage in rats exposed to acute hypoxia, chronic hypoxia, and acute and chronic hypoxia associated with cold has been estimated and compared with controls. Different fractions of phospholipids were separated by thin layer chromatography. Results showed that acute hypoxia lowered phospholipids in lung lavage but superimposition of cold lowered phospholipids both in lung tissue and lavage. In chronic hypoxia, phospholipid contents of lung tissue and lavage decreased while the addition of cold showed no further reduction in lung tissue phospholipids; on the contrary phosphatidyl choline fraction of lung lavage increased. It is concluded that the effect of hypoxia alone in lowering surfactant is related to the duration of exposure. Cold with hypoxia lowers phospholipids in the acute stage; in the chronic stage; it does not further reduce phospholipids. (Author)

A80-41981 Pickup of visual information by the pilot during a ground control approach in a fighter aircraft simulator. J. P. Papin, P. Naureils, and G. Santucci (Centre d'Etudes et de Recherches de Médecine Aérospatiale, Paris, France). *Aviation, Space, and Environmental Medicine*, vol. 51, May 1980, p. 463-469. 18 refs.

Before providing the new single-seat fighter aircraft with selective visual information display systems, it is necessary to conduct new studies of the visual behavior of pilots flying these aircraft in order to determine the nature of information to be displayed. The authors describe a modified NAC Eye Mark recorder which can be used in tight spaces without any interfering light source and give an example of its use in an experiment conducted in a Mirage III R training simulator. The reported experiment was designed to analyse the visual behavior of 12 pilots of four different qualification levels who flew a ground control approach (GCA) test each day for five consecutive days. The results show that the pilot's visual behavior is stable, both on an intra- and inter-individual basis. In addition, it is possible to classify the control panel instruments as a function of the number of times and length of time they are checked. (Author)

A80-41982 Comparison of reactive hyperemia in warm and cool human forearms over a range of ischemic periods. I. Shakir, B. A. Gooden, and I. C. MacDonald (Queen's Medical Centre, Nottingham, England). *Aviation, Space, and Environmental Medicine*, vol. 51, May 1980, p. 470-472. 11 refs.

The characteristics of reactive hyperemia in the warm human forearm are well documented but comparable data at lower temperatures are sparse. The present study was designed to examine reactive hyperemia in the forearms of 8 subjects using a range of ischemic periods of 0.5, 1, 2, 4, and 8 min at plethysmograph temperatures of 34 and 14 C. The peak flow rates and hyperemic volumes following all of the durations of ischemia were significantly lower at 14 C. There was a proportional relationship between the hyperemic volume and the duration of ischemia at both temperatures. The differences noted in the magnitude of the responses at the two temperatures may be explained by a reduction in the rate of metabolism in the forearm at the lower temperature, but reduced vascular distensibility cannot be excluded. (Author)

A80-41983 * Effects of chronic centrifugation on skeletal muscle fibers in young developing rats. W. D. Martin (Albert B. Chandler Medical Center, Lexington, Ky.). *Aviation, Space, and Environmental Medicine*, vol. 51, May 1980, p. 473-479. 22 refs. Grant No. NsG-2187.

Three groups of 30-d old male and female rats were centrifuged for 2, 4, 8, and 16 weeks, after which their soleus and plantaris muscles were analysed for changes in proportions of muscle fiber types. The groups were: earth control, maintained at earth gravity without rotation; rotation control, subjected to a gravitational force of 1.05 G and 28 rpm; and rotation experimental, subjected to a gravitational force of 2 G and 28 rpm. Muscle fibers were classified into four fiber types on the basis of actomyosin ATPase activity as slow oxidative, fast oxidative glycolytic and either fast glycolytic (plantaris) or intermediate (soleus). Hypergravity resulted in an increase in slow oxidative fibers in soleus relative to the earth control, but not of females treated similarly. The relationship of body weight to the changes in proportion of slow oxidative fibers is discussed. (Author)

A80-41984 Rocket plume burn hazard. A. M. Stoll, J. R. Piergallini, and M. A. Chianta (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.). *Aviation, Space, and Environmental Medicine*, vol. 51, May 1980, p. 480-484. 10 refs.

By use of miniature rocket engines, the burn hazard posed by exposure to ejection seat rocket plume flames was determined in the anaesthetized rat. A reference chart is provided for predicting equivalent effects in human skin based on extrapolation of earlier direct measurements of heat input for rat and human burns. The chart is intended to be used in conjunction with thermocouple temperature measurements of the plume environment for design and modification of escape seat system to avoid thermal injury on ejection from multiplace aircraft. (Author)

A80-41985 Acceleration effects on pulmonary blood flow distribution using perfusion scintigraphy. J. E. Whinnery (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 51, May 1980, p. 485-491. 11 refs.

The effects of increased acceleration (Gz stress) on the distribution of pulmonary blood flow in the miniature swine were

measured with a gamma scintillation camera using Technecium 99-m labeled human macro-aggregated albumin and human albumin microspheres. Multiple studies with Gz levels from -4 Gz to +8 Gz were obtained in the same animals, thus allowing an accurate comparison of the effects of acceleration stress on the distribution of pulmonary blood flow. The animals were fitted with abdominal anti-G suits and instinctively performed straining maneuvers, thus simulating the environment and actions of advanced fighter aircraft pilots during the increased acceleration stress of aerial combat maneuvering. Marked shifts in pulmonary flow were observed with both +Gz and -Gz acceleration. The greatest magnitude of change during +Gz was observed up to +4 Gz; however, changes in the distribution of flow did occur even up to +8 Gz. Large changes in blood flow distribution also occurred in going to -4 Gz. The changes in perfusion distribution in the lungs are a major determinant of the blood oxygen desaturation that occurs during +Gz acceleration. A decreased arterial blood saturation can affect overall performance and reduce effectiveness during sustained high +Gz. (Author)

A80-41986 **Aerobic power and body fat of men and women during army basic training.** J. F. Patton, W. L. Daniels, and J. A. Vogel (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Aviation, Space, and Environmental Medicine,* vol. 51, May 1980, p. 492-496. 22 refs.

A80-41987 * **Interactions between surface cooling and LBNP-induced central hypovolemia.** P. B. Raven (Moss Heart Center, Dallas; Texas College of Osteopathic Medicine, Fort Worth, Tex.), M. Saito, F. A. Gaffney, J. Schutte, and C. G. Blomqvist (Moss Heart Center, Dallas, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 51, May 1980, p. 497-503. 30 refs. Research supported by the Moss Heart Foundation; Grant No. NsG-9026.

The paper describes a study carried out to determine the extent to which whole body surface cooling (WBSC) modifies the effects of the central hypovolemia produced by lower body negative pressure (LBNP) at normal skin temperatures. It is shown that WBSC produces a central displacement of cutaneous venous volume resulting in an increase in stroke volume. V.T.

A80-41988 **Development, test, and evaluation of an advanced anti-G valve for the F-15.** R. R. Burton, R. M. Shaffstall, and J. L. Jaggars (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 51, May 1980, p. 504-509. 5 refs.

A Hi Flow Ready Pressure (HFRP) anti-G valve increasing the rate of G-suit pressurization threefold is described. The valve was tested on eight F-15 pilots. It had better valve response, reduced valve error scores, and allowed the pilots to tolerate high-G exposures with less effort. V.T.

A80-41989 **Prevalence of coronary heart disease risk factors in a young military population.** J. F. Patton and J. A. Vogel (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Aviation, Space, and Environmental Medicine,* vol. 51, May 1980, p. 510-514. 38 refs.

This study was undertaken to determine the extent to which coronary heart disease risk factors are manifest in a young (17-35 years old) male military population. Approximately 360 individuals underwent medical and physical determination of body composition, blood cholesterol analysis, blood pressure measurement, history of smoking, and a maximal exercise stress test to assess maximal oxygen uptake (VO2 max) and the incidence of electrocardiographic abnormalities. Obesity (over 20% body fat), elevated blood cholesterol (over 200 mg/dl), and cigarette smoking (over 10 cigarettes/d) were the most predominant risk factors with incidences of 29, 32, and 36%, respectively. Only 2.4% of the sample had a positive stress test as indicated by an ST-segment depression of 1 mm or greater. An inverse relationship between maximal oxgen uptake and percent body fat was the only significant finding between level of aerobic power and risk factor prevalence. These data provide information on the prevalence of cardiovascular disease risk factors in an age group for which there has been only limited information. (Author)

A80-41990 **Agricultural aviation medicine in the Soviet Union.** S. R. Mohler (Wright State University, Dayton, Ohio). *Aviation, Space, and Environmental Medicine,* vol. 51, May 1980, p. 515-517. 6 refs.

The paper examines agricultural aviation medicine in the Soviet Union. The program gives specific attention to aerial application operations and includes special preflight pilot medical examinations, aircraft with specialized protective airflow systems for pilots, minimum flight altitude spraying limit of 5 m, and the use of a 'chemical logbook' by each pilot in addition to the flight logbook. The Soviet workhorse aircraft, the Antonov AN-2, can serve multipurpose roles since it can be converted to executive, courier, cargo, air taxi, or ambulance use. A new single-engine turbojet biplane, the Polish M-15, is being evaluated in the Soviet Union as a replacement for the AN-2. A.T.

A80-41991 **Disorders of the menstrual cycle in airline stewardesses.** R. Iglesias, A. Terrés, and A. Chavarria (Compañia Mexicana de Aviación, S.A., Mexico City, Mexico). *Aviation, Space, and Environmental Medicine,* vol. 51, May 1980, p. 518-520. 8 refs.

Of 200 airline stewardesses, 39 percent underwent unfavorable changes in the menstrual cycle after commencing aeronautical activities while 11 percent who had previous disorders healed soon after joining the company. Although 48 percent of the stewardesses underwent changes in menstruation during flight, in about half of these the menstrual flow increased and in the other half it decreased or disappeared, only to reappear with greater intensity after the flight; 38 percent of the stewardesses manifested suffering from pelvic discomfort after long flights. Sufficient research in this field has not been done. Therefore, it is difficult to trace the exact origin and mechanism of these changes in the menstrual cycle. Stress and internal desynchronization due to disruption of circadian rhythm may intervene in generating these disorders. (Author)

A80-41992 **Relation of breathing oxygen-argon gas mixtures to altitude decompression sickness.** J. P. Cooke, K. G. Ikels, J. D. Adams, and R. L. Miller (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 537-541. 32 refs.

A 95% oxygen-5% argon breathing mixture produced by a molecular sieve generator was shown to be similar to a 95% O2-5% N2 mixture for breathing during 1-h exposures at 7,620 m or 10,972 m, as determined by the detection of proportionate numbers of intravascular bubbles in the pulmonary arteries of dogs. Comparable results were obtained with 95% O2-5% He or 100% O2. The partial pressures of a 5% mixture at 7,620 and 10,972 m were 14.1 and 8.6 Torr, respectively, and were apparently low enough so that the nonmetabolizable gases did not result in differences in the incidence of intravascular bubble formation or decompression sickness. Argon at the 10% level showed a nonsignificant trend to produce more bubbles. Individual susceptibility or resistance to bubble formation was observed with the different gases. Denitrogenation with either 5

no subject complaints were attributable to cold air inhalation. Recent studies in the literature suggest that cold air is not fully warmed in the upper respiratory passages; however, the present study observed only slight changes in measured physiological responses to rest and exercise with cold air breathing. (Author)

A80-41993 **Ambiguous response of lung lamellar bodies to sauna-like heat stress in two age groups of adult male rats.** M. E. Heino (Helsinki, University, Helsinki, Finland). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 542, 543. 10 refs. Research supported by the Finnish Sauna Society.

A80-41994 **Active muscle torques about long-bone axes of major human joints.** A. E. Engin (Ohio State University, Columbus,

Ohio) and I. Kaleps (USAF, Aerospace Medical Research Laboratory, Wright-Patterson AFB, Ohio). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 551-555. USAF-supported research.

Incorporation of the active muscle torques into the multi-segmented total-human-body models can be considered the next major improvement of these models. The first step toward achievement of this goal is to obtain active muscle torque data about long-bone axes of major human joints. This paper presents results of research conducted to collect such data at the shoulder, hip, elbow, knee, and ankle joints. Active muscle torques were determined about the long-bone axes of the upper arm, upper leg, lower arm, and lower leg, which are the body segments associated with the major joints mentioned. Numerical results are presented for three male subjects for a specific number of body segment orientations with respect to the joints. It was concluded that, although there are intra- and inter-subject variations for the maximum values of the active muscle torques about long-bone axes, there are some trends one can establish for the behavior of the magnitudes of these torques. (Author)

A80-41995 * Retinal changes in rats flown on Cosmos 936 - A cosmic ray experiment. D. E. Philpott, R. Corbett, C. Turnbill, S. Black, D. Dayhoff, J. McGourty, R. Lee, G. Harrison (NASA, Ames Research Center, Ultrastructural Research Laboratory and Biomedical Research Div., Moffett Field, Calif.), and L. Savik (Ministerstvo Zdravookhraneniia SSSR, Institut Mediko-Biologicheskikh Problem, Moscow, USSR). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 556-562. 27 refs.

Ten rats, five centrifuged during flight to simulate gravity and five stationary in flight and experiencing hypogravity, orbited the Earth. No differences were noted between flight-stationary and flight-centrifuged animals, but changes were seen between these two groups and ground controls. Morphological alterations were observed comparable to those in the experiment flown on Cosmos 782 and to the retinal cells exposed to high-energy particles at Berkeley. Affected cells in the outer nuclear layer showed swelling, clearing of cytoplasm, and disruption of the membranes. Tissue channels were again found, similar to those seen on 782. After space flight, preliminary data indicated an increase in cell size in montages of the nuclear layer of both groups of flight animals. This experiment shows that weightlessness and environmental conditions other than cosmic radiation do not contribute to the observed damage of retinal cells. (Author)

A80-41996 On-line analysis of eye movements using a digital computer. R. W. Baloh, L. Langhofer, V. Honrubia, and R. D. Yee (California, University, Los Angeles, Calif.). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 563-567. 10 refs. Grant No. NIH-NS-09823.

We describe a microcomputer system for on-line analysis of eye movement recordings. Quantitative data from the patient and statistical comparison with normative data is available within seconds of test completion. Three types of eye movements are analyzed - voluntary saccades, smooth pursuit, and nystagmus. The first two are induced by a computer-controlled laser dot projected onto a screen and the third by a computer-controlled optokinetic drum, caloric infusion, and rotary chair. The computer algorithm differentiates the eye position signal to yield an instantaneous eye velocity record. Saccades are identified based on their characteristic velocity profile. For pursuit and nystagmus, the velocity record is modified by linearly interpolating across segments in which saccades occurred. The gain (output eye velocity/input eye velocity) is calculated after Fourier analysis of the data. (Author)

A80-41997 * Piracetam and fish orientation during parabolic aircraft flight. R. B. Hoffman, G. A. Salinas, and J. L. Homick (NASA, Johnson Space Center, Neurophysiology Laboratory, Houston, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 568-576. 40 refs.

Goldfish were flown in parabolic Keplerian trajectories in a KC-135 aircraft to assay both the effectiveness of piracetam as an antimotion sickness drug and the effectiveness of state-dependent training during periods of oscillating gravity levels. Single-frame analyses of infrared films were performed for two classes of responses - role rates in hypogravity or hypogravity orienting responses (LGR) and climbing responses in hypergravity or hypergravity orienting responses (HGR). In Experiment I, preflight training with the vestibular stressor facilitated suppression of LGR by the 10th parabola. An inverse correlation was found between the magnitudes of LGR and HGR. Piracetam was not effective in a state-dependent design, but the drug did significantly increase HGR when injected into trained fish shortly before flight. In Experiment II, injections of saline, piracetam, and modifiers of gamma-aminobutyric acid - aminooxyacetic acid (AOAA) and isonicotinic acid did not modify LGR. AOAA did significantly increase HGR. Thus, the preflight training has a beneficial effect in reducing disorientation in the fish in weightlessness, but the drugs employed were ineffective. (Author)

A80-41998 Red blood cell count /RCC/ and volume /MCV/ of three subjects in a hypobaric chamber. L. S. Sewchand, R. E. Lovlin, G. Kinnear, and S. Rowlands (Calgary, University, Calgary, Alberta, Canada). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 577, 578. 12 refs. Research supported by the Medical Research Council of Canada.

Measurements of red blood cell count (RCC) and mean corpuscular volume (MCV) were made on three subjects during a 42-h continuous exposure to low barometric pressure. RCC varied insignificantly in two subjects, but increased steadily with time in the third. MCV decreased appreciably (12-14%) in all three subjects 5 h after exposure to the low pressure but returned close to baseline values after 40 h. It is concluded that 1) short exposures to low barometric pressures result in a reduction in red cell size; 2) increased red cell production in response to low oxygen levels shows individual variations. (Author)

A80-41999 The effect of sustained +Gz acceleration on extravascular lung water content in domestic fowl. W. J. Weidner and L. F. Hoffman (California, University, Davis, Calif.). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 579-582. 19 refs. Research supported by the California Lung Association and California Heart Association.

A80-42000 An attempted validation study of the birthdate-based biorhythm /BBB/ hypothesis. C. E. Englund and P. Naitoh (U.S. Navy, Naval Health Research Center, San Diego, Calif.). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 583-590. 37 refs. Navy-supported research.

The birthdate-based biorhythm (BBB) hypothesis was examined for utility as a predictor of human performance. Data from quizzes of 26 students taken periodically throughout a semester, and measures over 1 month of landing performance by seven pilots were analyzed by multiple regression/correlation methods. Regression equations were developed to test the correspondence between performance and cycle phases. A second analysis used a nonorthogonal least-square spectrum method to determine if the data contained any systematic rhythms in the infradian range. No significant results were obtained which would support the BBB hypothesis as a predictor of human performance. Also, no evidence was found to substantiate the existence of the three proposed BBB cycles. (Author)

A80-42001 Physiological effects of cold air inhalation during exercise. G. H. Hartung, L. G. Myhre, and S. A. Nunneley (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 51, June 1980, p. 591-594. 17 refs.

Selected physiological responses of six normal subjects were observed, during rest and exercise, while they breathed either

ambient or cold (-35 C) air. All experiments were 10 min in duration, and the exercise experiments consisted of pedalling a bicycle ergometer at loads requiring approximately 60% and 75% of each subject's maximum oxygen consumption. Heart rates and minute ventilations during the most strenuous exercise averaged approximately 170 bpm and 70 l, respectively. Diastolic blood pressure was significantly higher, and expired air temperature was significantly lower, during cold air inhalation. Oxygen uptake, respiration rate, and rectal temperature were not affected by cold air breathing and no subject complaints were attributable to cold air inhalation. Recent studies in the literature suggest that cold air is not fully warmed in the upper respiratory passages; however, the present study observed only slight changes in measured physiological responses to rest and exercise with cold air breathing. (Author)

A80-42002 * Energy status and oxidation reduction status in rat liver at high altitude /3.8 km/. R. D. Reed and N. Pace (California, University, Berkeley, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 51, June 1980, p. 595-602. 31 refs. Grant No. NsG-7262.

Adult male rats were exposed to 3.8-km altitude for intervals ranging from 1 h-60 d. Liver samples were taken under light ether anesthesia and were examined by enzymatic analyses. Within 1-6 h of hypoxic exposure, ATP levels decreased while ADP and AMP levels increased, producing a fall in calculated ATP/ADP and adenylate charge ratios. Concurrently, lactate/pyruvate and alpha-glycerophosphate/dihydroxyacetone phosphate ratios increased markedly. Direct measurements of cellular pyridine nucleotides indicated increased NADH/NAD and NADPH/NADP ratios. Levels of total adenosine phosphates and pyridine nucleotides decreased in a significant accompanying response. Many metabolite levels and calculated ratios returned to near-normal values within 1 week of exposure, indicating secondary intracellular adjustments to hypoxic stress; however, persistence of that stress is reflected in lactate concentrations and both substrate redox ratios. Results support and explore concepts that increased oxidation-reduction status and decreased energy status are primary events during hypoxia. (Author)

A80-42003 * Thresholds for detection of constant rotary acceleration during vibratory rotary acceleration. B. Clark, J. D. Stewart, and N. H. Phillips (NASA, Ames Research Center, Moffett Field; San Jose State University, San Jose, Calif.). *Aviation, Space, and Environmental Medicine*, vol. 51, June 1980, p. 603-606. 19 refs. Grant No. NCC2-35.

The effects of vibratory angular acceleration on detection thresholds for constant angular acceleration in a dynamic flight simulator are reported in three experiments. Detection thresholds were determined for 10 pilots and four nonpilots using a random, double-staircase procedure while the subjects sat erect in a device which rotated about an earth-vertical axis. Constant angular acceleration were presented for 0.5 and 1.0 s with concurrent, vibratory angular acceleration at 1 and 5 Hz, and thresholds with no vibratory angular acceleration were established. The thresholds were obtained while the subjects observed a visual reference in the enclosed cockpit in two experiments and in total darkness in a third. The results confirmed earlier experiments showing an inverse relationship between the duration of constant angular acceleration and detection threshold and showed that the detection thresholds in darkness were higher than with a visual reference present. Two analyses of variance revealed no significant differences in thresholds across the three vibration conditions. These results indicate that vibratory angular acceleration of fairly high levels can be present in a dynamic flight simulator without masking the pilot's ability to detect either maneuver or disturbance motions. (Author)

A80-42004 Psychomotor deterioration during exposure to heat. Y. Epstein, G. Keren, J. Moisseiev, O. Gasko, and S. Yachin (Ministry of Defence, Medical Corps - Physiological Research Unit, Tel Aviv; Chaim Sheba Medical Centre, Samat-Gan, Israel). *Aviation, Space, and Environmental Medicine*, vol. 51, June 1980, p. 607-610. 14 refs.

The effect of different heat loads on vigilance and complex cognitive tasks involved in a mission of different intensities were examined. Nine healthy volunteers were randomly exposed for 2 h to three climatic conditions: comfort (21 C), moderate heat load (30 C) and severe heat load (35 C). The subjects were assigned to missions of shooting at targets of three different sizes. Physiological parameters (heart rate, rectal temperature, and sweat rate) and psychomotor ability were monitored. Exposure to 35 C gave rise to elevated heart rate, rectal temperature, and dehydration of 2.5%, while exposure to 21 C and 30 C caused no physiological burden. Speed of performance were significantly higher when the subjects were exposed to moderate heat load than to either comfort or severe heat load. Percentage of errors, however, rose gradually with the rise in heat load. The results indicate: (1) the effect of the intensity of the task and heat load on deteriorating performance are synergistic; (2) psychomotor performance deteriorates even before physiological parameters are impaired, possibly because of feelings of discomfort; and (3) even highly motivated subjects are effected by heat load, especially when assigned to complex missions which require a high state of vigilance, cooperation, and coordination. (Author)

A80-42005 Human tolerance to aerial combat maneuvers. R. R. Burton and R. M. Shaffstall (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 51, July 1980, p. 641-648. 15 refs.

An acceleration profile was developed on the USAF School of Aerospace Medicine's 6.1-m radius centrifuge to measure human tolerance to the Aerial Combat Maneuver (ACM). The ACM profile is a continuous repetitive, 4.5 G for 15 s to 7 G for 15 s, cyclic G exposure which is terminated by the subject at his fatigue endpoint. ACM tolerances using this type of G profile were determined for seven subjects at four different seatback angles; i.e. 13, 30, 55, and 65 deg from the vertical. Group (mean + or - S.E.) tolerances for the ACM were 170 + or - 17 s at 13 deg and 541 + or - 48 s at 65 deg. These tolerances were not usually correlated with relaxed gradual onset G tolerances. The subjective fatigue endpoint was physiologically verified using heart rate, heart rhythm, and performance criteria at the four seatback angles. The potential value of the ACM profile is considered as a measure of the effectiveness of anti-G equipment and methods in the aerial combat environment. (Author)

A80-42006 Frank orthogonal vectorcardiograms in humans during and after exposure to +Gz acceleration stress. M. H. Laughlin, J. E. Whinnery, J. A. Strom, D. J. Cosgrove, E. L. Fitzpatrick, H. N. Keiser, and R. N. Whittaker, Jr. (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine*, vol. 51, July 1980, p. 653-660. 25 refs.

Frank orthogonal vectorcardiograms (VCGs) were recorded from 10 subjects prior to, during, and for 15 min after exposures to +3 Gz, +5 Gz and +7 Gz. The order of acceleration exposure was randomized, with the individual exposures separated by at least 1 week. Standard USAF anti-G suits were worn by all subjects. Detailed analysis of the scalar lead electrocardiograms revealed no abnormalities. There were no consistent signs of conduction disturbances or ischemic ST-T segment changes. The QRS axis of the VCG demonstrated posterior rotation in the sagittal plane and counterclockwise rotation in the transverse plane during +Gz stress. The changes in the VCGs recorded during +Gz stress appeared to be related to rotational changes of the heart due to mechanical stress or 10% mixtures of the inert gases was quite effective, as shown by a reduction in the number of intravascular bubbles detected. (Author)

A80-42007 Catecholamine excretion in A-10 pilots. G. S. Krahenbuhl, S. H. Constable, P. W. Darst, J. R. Marett, G. B. Reid, and L. C. Reuther (Arizona State University, Tempe, Ariz.). *Aviation, Space, and Environmental Medicine*, vol. 51, July 1980, p. 661-664. 16 refs. Contract No. F33615-78-C-0053.

Catecholamine excretion was determined for 15 USAF pilots during surface attack training in the A-10 aircraft. Timed urine samples were used to determine excretion rates of epinephrine and

norepinephrine during basal conditions, during five sorties performed in high-realism simulators, and during six actual flights. Catecholamine excretion was significantly elevated (p less than 0.05) over basal rates during all 11 training sorties; therefore, it was concluded that A-10 conversion and surface attack training results in a significant stress response in the subjects. The stress response experienced in the simulator diminished across trials; the stress response from aircraft flights remained steady through all sorties monitored. The relative proportions of epinephrine and norepinephrine remained similar across all but the final sorties in both the simulator and the aircraft. These occasions were typified by increased norepinephrine and decreased epinephrine excretion rates. (Author)

A80-42008 Molecular sieve generation of aviator's oxygen - Performance of a prototype system under simulated flight conditions. R. L. Miller, K. G. Ikels (USAF, School of Aerospace Medicine, Brooks AFB, Tex.), M. J. Lamb, E. J. Boscola (U.S. Naval Material Command, Naval Air Development Center, Warminster, Pa.), and R. H. Ferguson (U.S. Naval Air Systems Command, Washington, D.C.). *Aviation, Space, and Environmental Medicine,* vol. 51, July 1980, p. 665-673. 9 refs.

The molecular sieve method of generating an enriched-oxygen breathing gas is one of several candidate onboard oxygen generation (OBOG) systems under joint Army-Navy-Air Force development for application in tactical aircraft. The performance of a nominal two-man-capacity molecular sieve oxygen generation system was characterized under simulated flight conditions. Data are given on the composition of the molecular sieve-generated breathing gas (oxygen, nitrogen, carbon dioxide, and argon) as a function of inlet air pressure, altitude, breathing gas flow rate, and ambient temperature. The maximum oxygen concentration observed was 95%, with the balance argon. At low demand flow rates and certain conditions of pressure and altitude, the argon enrichment factor exceeded that of oxygen giving a maximum argon concentration of 6.6% with the balance oxygen. The structural integrity of the unit was verified by vibration and centrifuge testing. The performance of the molecular sieve unit is discussed in the context of aircraft operating envelopes using both diluter-demand and 100% delivery subsystems. (Author)

A80-42010 Device for measuring the precision of eye-hand coordination while tracking changing size. D. Regan and K. I. Beverley (Dalhousie University, Halifax, Canada). *Aviation, Space, and Environmental Medicine,* vol. 51, July 1980, p. 688-693. 14 refs. National Research Council of Canada Grant No. A-0323; Grant No. AF-AFOSR-78-3711.

Psychophysical evidence supports the idea that the human visual pathway computes an object's rate of change of angular size rather independently of other visual parameters, including contrast and intensity. This independence could provide a basis for accurately judging the component of an object's velocity along a line through the eye in the working visual environment where many visual parameters vary simultaneously. We describe a procedure for quantifying a subject's ability to track changing size, and illustrate the procedure with preliminary experimental data. The subject's R.M.S. tracking errors are displayed in three frequency bands. Our device also measures the perturbing effect of sideways motion upon the subject's ability to track changing size. Such data may go some way to predict a subject's performance in tasks of eye-limb coordination, especially where visual information is largely restricted to the changing-size channel. (Author)

A80-42011 Toward the development of a new aptitude selection test battery for air traffic control specialists. J. O. Boone (FAA, Civil Aeromedical Institute, Oklahoma City, Okla.). *Aviation, Space, and Environmental Medicine,* vol. 51, July 1980, p. 694-699. 14 refs.

In an effort to update and refine the selection battery for air traffic controllers, five experimental tests measuring aptitudes and skills considered important in air traffic work were administered to 1,828 newly selected air traffic control specialist (ATCS) trainees on their first day of training at the FAA Academy in Oklahoma City. The five experimental tests and the five tests presently used by the Office of Personnel Management (OPM) for selecting ATCS trainees were employed in an iterative stepwise regression (stepdown procedure). The tests that made a significant contribution in predicting Academy scores were then used to form a composite and the old test battery and the new battery were compared. The new composite demonstrated a statistically significant increase in the multiple correlation over the old test battery. Use of the new test battery could result in a savings to the FAA in terms of Academy attrition due to failures. It could also aid in upgrading the quality of ATCS selectees and aid in minimizing human error in air traffic control work. (Author)

A80-42012 Alveolar macrophages and pulmonary surfactant of altitude-raised rats. K. S. Hegde, R. Kumar, B. Krishna, and H. S. Nayar (Defence Institute of Physiology and Allied Sciences, Delhi, India). *Aviation, Space, and Environmental Medicine,* vol. 51, July 1980, p. 700-703. 17 refs.

Alveolar macrophages and pulmonary surfactant were estimated in rats raised at high altitude (3500 m) and compared with control rats. Macrophages were obtained by washing the lungs with isotonic saline and counted in a haemocytometer to obtain the total number present. Proportions of two types of macrophages (precursor and mature) have been evaluated. Different fractions of phospholipids in lung lavage and lung tissue were separated by thin layer chromatography and estimated colorimetrically. The results showed a reduction in the number of macrophages/g of lung with a corresponding decrease in surfactant. The percentage of immature (precursor) macrophages was lower in high-altitude-raised rats. These changes observed in alveolar macrophages and lung surfactant could be due to an altered metabolism at high altitude. (Author)

A80-42013 * The architecture of the avian retina following exposure to chronic 2 G. R. G. Orlando and J. A. Negulesco (Ohio State University, Columbus, Ohio). *Aviation, Space, and Environmental Medicine,* vol. 51, July 1980, p. 704-708. 18 refs. Research supported by the Ohio State University; Contract No. NAS2-6634.

Rhode Island Red female chicks at 2 weeks posthatch were subjected, for 7 d, to either earth gravity of 1 G or a 2-G hypergravity environment by chronic whole-body centrifugation. Animals were sacrificed at 3 weeks posthatch and the eyes were enucleated, fixed in 10% BNF, doubly embedded, sectioned at 7-8 microns and routinely processed with H & E for histological examination. Compared to normogravity controls, animal exposure for 1 week to the chronic effects of 2-G resulted in a significantly decreased mean width of the photoreceptor, inner nuclear, and inner plexiform retinal layers. The outer nuclear, outer plexiform, and ganglion cell layers of the retina appeared minimally affected by the hypergravity state since the mean width of these layers showed no noticeable differences from earth gravity control animals. The present anatomic findings suggest a reduction in the detection of motion or rapid changes in illumination by the avian retina when the animal is exposed at a 2-G environment. (Author)

A80-42014 Aeromedical transportation of psychiatric patients - Historical review and present management. D. R. Jones (USAF, School of Aerospace Medicine, Brooks AFB, Tex.). *Aviation, Space, and Environmental Medicine,* vol. 51, July 1980, p. 709-716. 32 refs.

A80-42015 Air transport of the man who needs everything. P. J. Hansen (USAF, Scott AFB, Ill.). *Aviation, Space, and Environmental Medicine,* vol. 51, July 1980, p. 725-728. 6 refs.

General considerations for the multiple-trauma victim should include a secure airway, a patent intravenous line, elevation of the head and chest over 10 deg, wounds dresses, use of nasogastric tube, urinary drainage catheter, stabilization and splinting of fractures, adequate orders to facilitate patient management during transport,

and a comprehensive summary of patient problems. A clinical assessment - preflight, inflight and postflight - preferably by the same person is ideal. The paper focuses on discussing the priorities followed in the clinical assessment: airway and breathing; bleeding (circulation and shock); digestive organs (rupture or injury); excretory organs (rupture or injury); fractures (splints, casts, and back supports); hide (burns and wounds); and good management plan. S.D.

A80-42051 # **The effect of the acute ischemia of the brain on the permeability of the hemato-ophthalmic barrier (Vliianie ostroi ishemii golovnogo mozga na pronitsaemost' gemato-oftal'micheskogo bar'era).** T. V. Birich and S. A. Eremenko (Minskii Meditsinskii Institut, Minsk, Belorussian SSR). *Akademiia Nauk BSSR, Doklady*, vol. 24, no. 6, 1980, p. 568-571. 12 refs. In Russian.

A80-42098 **Use of the multivariate approach to enhance the diagnostic accuracy of the treadmill stress test.** P. S. Greenberg, B. Cangiano, L. Leamy, and M. H. Ellestad (Memorial Hospital Medical Center, Long Beach, Calif.). *Journal of Electrocardiology*, vol. 13, no. 3, 1980, p. 227-236. 39 refs. Research supported by the Memorial Hospital Medical Foundation Funds.

The use of a computerized multivariate analysis to enhance the sensitivity, specificity and predictive value of the treadmill stress test is investigated. Twenty-one selected variables were analyzed for 142 male and 57 female patients who had undergone a stress test and cardiac catheterization with selective coronary angiography. A univariate analysis of variance reveals ten of the variables in males and 14 of the variables in women to exhibit significant differences between normal and diseased (greater than 70% stenosis in one or more coronary arteries) groups. A multivariate discriminant analysis of the variables then shows only three variables in men (test duration, infarct by ECG, ST depression in the recovery period) and five variables in women (infarct history, anginal pain during test, ST resting changes, infarct by ECG, age) to be significant discriminators. Sensitivities of 84%, 85% and 85%; specificities of 80%, 94% and 86%; and predictive values of 89%, 90% and 89% are obtained for the *males, females and the entire group, respectively; and it is concluded that multivariate discriminant analysis is a reliable means of* determining the probability of coronary artery disease in a highly select group of patients. A.L.W.

A80-42341 # **Investigation of the operation of eye-telescope systems (Issledovanie funktsionirovaniia sistemy glaz-teleskop).** E. V. Khrunov, V. M. Kazachkov, V. I. Metlik, and E. N. Khludeev. *Kibernetika i Vychislitel'naia Tekhnika*, no. 46, 1979, p. 8-16. 5 refs. In Russian.

Experimental results are presented on the operation of eye-telescope systems under conditions of space flight; such operations may be necessary when automatic remote viewing equipment aboard a manned spacecraft fails and its operation must be replaced by visual observation. The tests consisted of continuous operator observation of an operative field of view with the aim of detecting and recognizing test objects. Results of ten-day studies show that operators who were subjected to simulated weightlessness performed slightly less well than those who were not subjected to weightlessness. B.J.

A80-42344 # **Exemplary model of an eye-telescope system for the detection of manned spacecraft on a background of stars (Primernaia model' sistemy glaz-telescop pri obnaruzhenii pilotiruemykh kosmicheskikh korablei na fone zvezd).** E. V. Khrunov, V. M. Kazachkov, and E. N. Khludeev. *Kibernetika i Vychislitel'naia Tekhnika*, no. 46, 1979, p. 27-30. In Russian.

A theoretical investigation of a model for the detection of manned spacecraft on a background of stars is presented. The stars and the spacecraft are considered to be point sources discretely and arbitrarily situated in the field of view; the search for the spacecraft model is carried out in the field of view of a telescope immobile with respect to the background. A formula is presented for the determination of the time of detection as a function of the relative contrast of stars with the background, the number of point sources in the telescope field of view, and the angular velocity of the observer. B.J.

A80-42345 # **The effect of psychic self-regulation /autogenous training/ on the maintenance of the professional skill of pilots (Vliianie psikhicheskoi samoreguliatsii /autogennoi trenirovki/ na sokhranenie professional'nogo navyka u letchikov).** Iu. F. Isaulov. *Kibernetika i Vychislitel'naia Tekhnika*, no. 46, 1979, p. 30-36. In Russian.

Experimental data are presented which show that methods of psychic self-regulation, particularly autogenous training, can be used to maintain the professional skills of pilots for long periods of time. A classification of the various stages of the development and maintenance of professional skills is presented, and the application of the methods discussed to specific flight situations is examined. B.J.

A80-42346 # **Some problems in pattern detection (Nekotorye voprosy obnaruzheniia zakonomernostei).** Iu. P. Ponomarev and L. A. Rastrigin (Rizhskoe Vysshee Voennoe Aviatsionnoe Inzhenernoe Uchilischche, Riga, Latvian SSR). *Kibernetika i Vychislitel'naia Tekhnika*, no. 46, 1979, p. 36-41. In Russian.

It is shown that multidimensional extrapolation can be used to estimate the parameters of a system in a new situation on the basis of limited a priori information on the parameters of the same system in known situations. Such algorithms can be used to develop highly efficient systems for the study of new processes on the basis of the rational combination of artificial and natural intelligences. It is emphasized that personal qualities have a great influence on the search for new patterns. B.J.

A80-42347 # **The ergatic intellect of electrical energy systems (Ergaticheskii intellekt elektroenergeticheskikh sistem).** Iu. V. Shcherbina and D. B. Banin (Kievskii Politekhnicheskii Institut, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika*, no. 46, 1979, p. 46-52. In Russian.

The ergatic intellect is defined as the combined intellect of a *multipurpose polyergatic system composed of the 'creative' possibili*ties of system personnel and of the formalized possibilities of acquisition, transmission, storage, processing, and application of information. The ergatic intellect should be based on machine memory, machine operations of data search, and the 'creative' activities of personnel. The concept of ergatic intellect is applied to the organization of a complex electrical energy system. A general algorithm for the activity of the human operator of such a system is presented. B.J.

A80-42349 # **Mathematical model for evaluating human operator activity in solving the problem of limiting controllability in an ergatic control and monitoring system (Matematicheskaia model' otsenki deiatel'nosti cheloveka-operatora pri reshenii zadachi predel'noi upravliaemosti v ergaticheskoi sisteme upravleniia i kontrolia).** V. A. Kas'ianov and L. N. Degtiarenko (Kievskii Institut Inzhenerov Grazhdanskoi Aviatsii, Kiev, Ukrainian SSR). *Kibernetika i Vychislitel'naia Tekhnika*, no. 46, 1979, p. 77-82. In Russian.

A80-42846 **Overview of human engineering considerations for electro-optical displays.** J. M. Booth and R. J. Farrell (Boeing Aerospace Co., Seattle, Wash.). In: Advances in display technology; Proceedings of the Seminar, San Diego, Calif., August 29, 30, 1979. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1979, p. 78-108. 126 refs.

Many parameters must be considered to obtain a display that is maximally useful to the human operator. Direct observation of a candidate display by the designer and survival in the marketplace provide some guidance, but whenever possible design decisions should be based on relevant test data. This paper summarizes the more critical design parameters, describes some of the available test data, and illustrates some of the characteristics of the test situation

that determine whether a set of test results are relevant to a particular design problem. This discussion of test characteristics applies both to the evaluation of available test results and to the design of new test programs aimed at providing data relevant to display component subsystem or system design. (Author)

A80-42847 Two-dimensional spatial frequency content and confusions among dot matrix characters. M. E. Maddox (Virginia Polytechnic Institute and State University, Blacksburg, Va.). In: Advances in display technology; Proceedings of the Seminar, San Diego, Calif., August 29, 30, 1979. Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1979, p. 109-116. 5 refs. Grant No. DAAG29-77-G-0067.

A two-phase study was conducted which related the confusions among dot matrix characters to the two-dimensional spatial frequency similarity of these characters. During the first phase of the study, subjects were shown single alphanumeric characters from four different dot matrix fonts and five matrix size/character subtense combinations. Data from this phase of the research were analyzed in terms of both correctness and character confusion frequencies. The second phase of the study consisted of digitizing and analyzing all characters from two of the fonts used in the first phase. The fonts chosen represent the most and least confusable of the four, based on the performance data obtained. In addition to the spatial frequency similarity measure, a simple digital Phi coefficient was calculated for each character pair. The final analysis performed in this study was the correlation of observed performance (confusions) with objective similarity measures (2-D spectra and Phi coefficients). (Author)

A80-42849 Two-channel model of image processing in the human retina. D. Granrath and B. R. Hunt (Arizona, University, Tucson, Ariz.). In: Advances in display technology; Proceedings of the Seminar, San Diego, Calif., August 29, 30, 1979.

Bellingham, Wash., Society of Photo-Optical Instrumentation Engineers, 1979, p. 126-133. 13 refs. Grant No. AF-AFOSR-76-3024-C.

A model describing the decomposition of imagery in the human retina is developed based on the retina's cellular structure. Two types of retinal cells, horizontals and amacrines, perform spatial averaging across the retina to form a low-pass image channel. This low spatial frequency information is fed back to the retina's receptor cells to form a difference channel of high-passed spatial frequencies. Such a model is suggested by electrophysiological as well as psychophysical evidence. Analysis of the model characterizes the low-pass channel as a contrast channel and the difference channel as an edge detection channel. Application of the model to image quality assessment suggests a two factor approach involving metrics in the model's eye domain. (Author)

A80-42935 # Myocardial dystrophy in athletes (Distrofiia miokarda u sportsmenov). L. A. Butchenko, M. S. Kushakovskii, and N. B. Zhuravleva. Moscow, Izdatel'stvo Meditsina, 1980. 224 p. 82 refs. In Russian.

The book discusses experimental investigations of changes in the myocardia of athletes, with particular emphasis on the state of the heart and hemodynamics in athletes with myocardial dystrophy brought on by overstressing. The physiological and pathological bases of myocardial dystrophy in athletes and in the general population are examined, with attention given to the biochemical and cytological disturbances of the myocardium caused by the elevated influence of the sympathetic nervous system during physical exertion, and the influence of myocardial dystrophy on heart function, hemodynamics, and respiration. Mechanisms for the disruption of myocardial repolarization observed in electrocardiograms indicating myocardial dystrophy are discussed, and a classification of the types of myocardial dystrophy encountered in athletes on the basis of electrocardiogram changes is presented. Finally, the treatment and prophylaxis of myocardial dystrophy in athletes are examined.

A.L.W.

A80-43011 Postflight studies on fungal phenotypes irradiated in space. P. A. Volz (Eastern Michigan University, Ypsilanti, Mich.). *(Kosmicheskie Issledovaniia,* vol. 17, Nov.-Dec. 1979, p. 920-926.) *Cosmic Research,* vol. 17, no. 6, May 1980, p. 762-769. 22 refs.

A80-43151 Physiological responses of men and women to humid and dry heat. Y. Shapiro, K. B. Pandolf, B. A. Avellini, N. A. Pimental, and R. F. Goldman (U.S. Army, Research Institute of Environmental Medicine, Natick, Mass.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 49, July 1980, p. 1-8. 32 refs.

Sex differences in the physiological responses of men and women to hot, wet and hot, dry environments are investigated. Nine female and 10 male subjects were acclimated to walking on a treadmill for two 50-min periods preceded and separated by 10-min rest periods and then exposed to six environments ranging from a control at 20 C, 40% relative humidity to hot-wet climates at 35 and 37 C and 90% and 80% relative humidity and hot-dry climates at 49 and 54 C and 20% and 10% relative humidity, during which the treadmill exercise was performed. During the hot-dry exposures, heart rates and rectal temperatures are found to be significantly lower in men, with no significant differences in sweat rates, while during hot-wet exposures, both mean final rectal temperature and sweating rates were lower in the females. These differences are not found to be correlated with differences in maximal O2 uptake, body weight, skin surface area or percentage of body fat, and are found to be negatively related to body surface area to mass ratio. It is suggested that the higher body surface area to mass ratio, better peripheral feedback from skin wettedness and higher thermoregulatory set point in females may explain their greater tolerance to hot-wet environments and lower tolerance to hot-dry environments.

A.L.W.

A80-43152 Interaction of dopamine and haloperidol with O2 and CO2 chemoreception in carotid body. S. Lahiri, T. Nishino, A. Mokashi, and E. Mulligan (Pennsylvania, University, Philadelphia, Pa.). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 49, July 1980, p. 45-51. 21 refs. Grants No. NIH-HL-19737-03; No. NIH-HL-08899-15.

Effects of dopamine and of a dopaminergic blocker, haloperidol, on the responses of carotid body chemoreceptors to hypoxia and hypercapnia were investigated in 16 anesthetized cats. Intravenous infusion of dopamine (10-20 microgram/min) decreased carotid body chemoreceptor responses to hypoxia and hypercapnia. The effect was greater at higher levels of arterial oxygen and carbon dioxide tension stimulus. Thus, the magnitude of the dopamine effect depended on the degree of both oxygen tension- and carbon dioxide tension-medicated excitation of the receptors. Haloperidol potentiated responses to both hypoxia and hypercapnia but apparently did not stimulate the receptors in the absence of these stimuli. Potentiation by haloperidol and inhibition by dopamine of excitatory effects due to arterial oxygen tension decrease and arterial carbon dioxide tension increase are complementary. The data suggest that chemoreception of dopamine, O2, and CO2 converges at some site in the carotid body. Persistence of hypoxic and hypercapnic responses, following dopamine-blocking doses of haloperidol, does not support the theory that regulation of dopamine release is responsible for O2 and CO2 chemoreception in the carotid body of the cat. (Author)

A80-43153 Changes in pulmonary PV characteristics of human subjects at an altitude of 5,366 m. A. Mansell (Hospital for Sick Children, Toronto, Canada), A. Powles (McMaster University, Hamilton, Ontario, Canada), and J. Sutton (Arctic Institute of North America, Yukon, Canada). *Journal of Applied Physiology: Respiratory, Environmental and Exercise Physiology,* vol. 49, July 1980, p. 79-83. 30 refs. Research sponsored by the Arctic Institute of North America; Grant No. NIH-HL-14102-05.

Changes in pulmonary pressure-volume (PV) characteristics were measured in seven young adult human subjects following 9-30 days

of acclimatization at an altitude of 5366 m. Increases in peak expiratory flow and decreases in total pulmonary resistance were found to be consistent with the reduced gas density at high altitude, however forced expiratory volume in 1 sec decreased in four of the subjects, suggesting an increase in the resistance of small airways or a decrease in lung recoil. Helium dilution measurements indicated increases in total lung capacity in all the subjects, and leftward shifts in the static expiratory pressure-volume curves were obtained with abnormally low lung recoil at 60% total lung capacity. The lung volume increases and PV curve shifts obtained were observed to be indistinguishable from those obtained during exercise-induced asthma and acute isocapnic hypoxia. A.L.W.

A80-43184 * # **A Portable Oxygen Subsystem - Description and preliminary thermal performance prediction.** F. Sribnik (United Technologies Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-7.* 9 p. 8 refs. Members, $1.50; nonmembers, $3.00. Contract No. NAS9-15246.

This paper describes the use, operation, and preliminary thermal modeling of a Portable Oxygen Subsystem (POS). The POS is a partial rebreather which is being developed for Shuttle Orbiter support. Normally used as a pre-breather for denitrogenization prior to EVA, this semi-closed, breath powered breathing system can also be used for emergencies in the event of a contaminated or oxygen-deficient cabin atmosphere, to support an emergency transfer between vehicles, or as a clean oxygen supply in the event of a contaminated ambient atmosphere in the vicinity of the Orbiter after landing. (Author)

A80-43192 * # **Water recovery by catalytic treatment of urine vapor.** P. Budininkas (Gard, Inc., Niles, Ill.), P. D. Quattrone, and M. I. Leban (NASA, Ames Research Center, Moffett Field, Calif.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-16.* 6 p. Members, $1.50; nonmembers, $3.00. Contracts No. NAS2-9715; No. NAS2-10237.

The objective of this investigation was to demonstrate the feasibility of water recovery on a man-rated scale by the catalytic processing of untreated urine vapor. For this purpose, two catalytic systems, one capable of processing an air stream containing low urine vapor concentrations and another to process streams with high urine vapor concentrations, were designed, constructed, and tested to establish the quality of the recovered water. (Author)

A80-43195 # **Environmental control of a pressurized equipment container for Shuttle flights - The Spacelab Igloo.** K. Beckmann (ERNO Raumfahrttechnik GmbH, Bremen, West Germany). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-19.* 6 p. Members, $1.50; nonmembers, $3.00.

One of the standard payloads of the new Shuttle Space Transportation System will be the European Spacelab. The modular concept of Spacelab provides eight basic flight configurations, three of which require the use of a pressurized equipment container - the so-called Igloo. The equipment installed in Igloo - various electronic boxes providing experiment support functions - has to be protected during all mission phases against a multitude of environmental loads. The environmental control system discussed herein has to provide working conditions for the electronic equipment consistent with their operating temperature, pressure and humidity requirements. The control of these parameters is achieved by the use of a Freon 21 fluid loop and external multilayer thermal insulation, a pressure relief valve and burst disk, and desiccators, respectively. This environmental control system has been developed and fabricated by ERNO. (Author)

A80-43205 # **A history of the Naval Research Laboratory contributions to submarine life support systems.** H. W. Carhart and J. E. Johnson (U.S. Navy, Naval Research Laboratory, Washington, D.C.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-29.* 8 p. 12 refs. Members, $1.50; nonmembers, $3.00.

Research on submarine life support systems culminated in the use of LiOH for CO2 removal, KO2 for rebreathers, chlorate candles as a source of O2 and catalytic removal of H2. With the advent of nuclear power, it became evident that the limitation of submergence time of a submarine would now be man himself and his need for a respirable atmosphere, rather than availability of stored power. Therefore, NRL intensified its efforts in the 1950's in atmosphere sampling and analysis, atmosphere control, sources of oxygen, CO2 removal, catalytic burning, adsorbent carbon beds, electrostatic precipitators and automatic monitoring and control. (Author)

A80-43206 # **Atmospheric monitoring in submersibles.** J. J. DeCorpo, J. R. Wyatt, and F. E. Saalfeld (U.S. Navy, Naval Research Laboratory, Washington, D.C.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-31.* 6 p. 9 refs. Members, $1.50; nonmembers, $3.00.

CAMS Mark I is a combination mass spectrometer-infrared atmosphere monitor that provides the fleet with a reliable, service approved analyzer with the ability to monitor continuously the atmosphere in various submarine locations. A second generation of the CAMS, CAMS Mark II, is currently under development which will expand the flexibility of CAMS Mark I while maintaining its high level of reliability. A description of CAMS Mark I will be presented with examples of operational accomplishments. A technical description of the CAMS Mark II development program will also be presented along with the system approach for integrating the life support equipment. (Author)

A80-43207 # **Carbon dioxide effects on submarines.** M. L. Shea, A. A. Messier, and K. R. Bondi. *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-32.* 2 p. 9 refs. Members, $1.50; nonmembers, $3.00.

Results of laboratory experiments and health studies of submarine personnel carried out in order to estimate the effects of prolonged exposure to elevated levels of CO2 are briefly summarized. The effects of CO2 on lungs, kidneys, and bones have been studied in animals. In contrast to experiments with 1% CO2, guinea pigs exposed to 0.5% showed no lung ultrastructural changes, although kidney calcification was observed after 8 weeks of exposure. Plasma calcium was elevated, and bone calcium showed a small decrease. An animal experiment involving CO2 concentrations from ambient (0.03%) to 0.5%, is being conducted now in order to determine at what CO2 levels all effects on target organs disappear. This is important, as improved scrubber design makes it possible to approach threshold CO2 levels in submarines. V.L.

A80-43208 # **Atmospheric monitoring for submarine applications.** J. E. Rice and B. A. Pilon (Bendix Corp., Communications Div., Ann Arbor, Mich.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-33.* 6 p. Members, $1.50; nonmembers, $3.00.

The Central Atmospheric Monitoring Systems (CAMS-Mark II) are described, noting that they will have the capability to provide data on all non-reactive gases in the range of 2 to 300 amu in concentrations, at the parts per million (ppm) or fractional ppm level. The discussion reviews the following items: (1) the development of atmospheric monitoring instrumentation, (2) the requirements of the new CAMS-II system, (3) the effect of these requirements on design options, and (4) a general description of the trade-off and selection of a mass spectrometer. M.E.P.

A80-43209 * # **NASA-Ames Life Sciences Flight Experiments program - 1980 status report.** W. E. Berry, C. C. Dant, G. MacLeod

(GE Management and Technical Services Co., Moffett Field, Calif.), and B. A. Williams (NASA, Ames Research Center, Moffett Field, Calif.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-34.* 3 p. Members, $1.50; nonmembers, $3.00.

The paper deals with the ESA's Spacelab LSFE (Life Sciences Flight Experiments) program which, once operational, will provide new and unique opportunities to conduct research into the effects of spaceflight and weightlessness on living organisms under conditions approximating ground-based laboratories. Spacelab missions, launched at 18-month intervals, will enable scientists to test hypotheses from such disciplines as vestibular physiology, developmental biology, biochemistry, cell biology, plant physiology, and similar life sciences. V.P.

A80-43210 # **A monitor for atmospheric composition and contaminants in closed environments.** R. M. Cason and M. E. Koslin (Perkin-Elmer Corp., Pomona, Calif.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-35.* 5 p. Members, $1.50; nonmembers, $3.00. Contract No. N00024-79-C-5689.

Exploration of the sea necessitates research on the long-term effects of a closed controlled atmosphere on man. Submarine atmosphere analyzers have been developed, including the Central Atmospheric Monitoring System (CAMS I). CAMS I represents an accurate and reliable monitoring system, but lacks flexibility. CAMS II is a flexible system with a minimum of operator interface. (Author)

A80-43211 * # **Life sciences experiments on Spacelab 1.** M. C. Buderer and G. A. Salinas (NASA, Johnson Space Center; GE Management and Technical Services Co., Houston, Tex.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-36.* 4 p. Members, $1.50; nonmembers, $3.00.

The objectives and procedures regarding various biological experiments to be conducted on Spacelab 1 are reviewed. These include the mapping of the HZE cosmic ray particle flux within the Spacelab module, investigating the effects of nullgravity on circadian cycles in the slime mold, Neurospora crassa, and measuring nutations of the dwarf sunflower, Helianthus annus. Emphasis is placed on research regarding possible changes in vestibulocular reflexes, vestibulospinal pathways, cortical functions involving perception of motion and spatial susceptibility. Also discussed are experiments regarding erythrokinetics in man and the effects of prolonged weightlessness of the humoral immune response in humans. J.P.B.

A80-43212 * # **Evaluation of biological models using Spacelab.** D. Tollinger (GE Management and Technical Services Co., Moffett Field, Calif.) and B. A. Williams (NASA, Ames Research Center, Moffett Field, Calif.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-38.* 7 p. 30 refs. Members, $1.50; nonmembers, $3.00. Contract No. NAS9-15850.

Biological models of hypogravity effects are described, including the cardiovascular-fluid shift, musculoskeletal, embryological and space sickness models. These models predict such effects as loss of extracellular fluid and electrolytes, decrease in red blood cell mass, and the loss of muscle and bone mass in weight-bearing portions of the body. Experimentation in Spacelab by the use of implanted electromagnetic flow probes, by fertilizing frog eggs in hypogravity and fixing the eggs at various stages of early development and by assessing the role of the vestibulocular reflex arc in space sickness is suggested. It is concluded that the use of small animals eliminates the uncertainties caused by corrective or preventive measures employed with human subjects. J.P.B.

A80-43213 * # **The development of a Space Shuttle Research Animal Holding Facility.** R. B. Jagow (Lockheed Missiles and Space Co., Inc., Sunnyvale, Calif.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-39.* 6 p. Members, $1.50; nonmembers, $3.00. Contract No. NAS2-10128.

The ability to maintain the well being of experiment animals is of primary importance to the successful attainment of life sciences flight experiment goals. To assist scientists in the conduct of life sciences flight experiments, a highly versatile Research Animal Holding Facility (RAHF) is being developed for use on Space Shuttle/Spacelab missions. This paper describes the design of the RAHF system, which in addition to providing general housing for various animal species, approximating the environment found in ground based facilities, is designed to minimize disturbances of the specimens by vehicle and mission operations. Life-sustaining capabilities such as metabolic support and environmental control are provided. RAHF is reusable and is a modular concept to accommodate animals of different sizes. The basic RAHF system will accommodate a combination of 24 500-g rats or 144 mice or a mixed number of rats and mice. An alternative design accommodates four squirrel monkeys. The entire RAHF system is housed in a single ESA rack. The animal cages are in drawers which are removable for easy access to the animals. Each cage contains a waste management system, a feeding system and a watering system all of which will operate in zero or one gravity. (Author)

A80-43214 * # **Experiment operations in Spacelab.** J. A. Giannovario (GE Management and Technical Services Co., Moffett Field, Calif.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-40.* 6 p. 8 refs. Members, $1.50; nonmembers, $3.00. Contract No. NAS9-15850.

A review is presented of laboratory procedures which are expected to be used in Life Sciences experiments on Spacelab. The impact of hypogravity on these procedures is discussed. Specimen treatments with solutions, 'snap' freezing, and micro-mass measurements are explored in detail. Potential solutions for these operational problems are offered. (Author)

A80-43215 # **O2 sensing for environmental control and monitoring systems.** J. D. Fuller and F. P. Rudek (General Electric Co., Space Div., Philadelphia, Pa.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-41.* 5 p. Members, $1.50; nonmembers, $3.00.

The General Electric oxygen (O2) partial pressure sensor has an operational record including thousands of hours of flight time accumulated during the NASA Skylab and Apollo-Soyuz missions. It was selected for use on the joint Soviet-American Apollo-Soyuz flight as well as the upcoming Shuttle and European Spacelab programs. In Shuttle and Spacelab, the sensor will perform the same function as the Skylab application which was to provide the control signal for maintaining proper O2 levels in the two gas (O2/N2) cabin atmosphere. The sensor is a self-contained, self-powered electrochemical cell which generates a millivolt signal as a function of the O2 partial pressure in the environment being monitored. The millivolt signal generated is automatically compensated for temperature and, if required, further conditioned to be compatible with end item telemetry and instrumentation systems. The General Electric O2 sensor has evolved into a device suitable wherever continuous real-time monitoring of O2 is critical and has been successfully adapted to a wide range of man-rated environmental control systems in addition to that of the spacecraft cabin O2 monitor described above. (Author)

A80-43216 # **Maintainable maintenance disconnect valve /MMDV/ for on-orbit component replacement.** T. E. Burr, C. K. Boynton, and A. O. Brouillet (United Technologies Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-42.* 5 p. Members, $1.50; nonmembers, $3.00.

Future long duration space missions will require maintenance disconnect valves to support on-orbit removal and replacement of fluid line components. The Maintainable Maintenance Disconnect Valve (MMDV), a lightweight disconnect valve developed specifically to simplify EVA and IVA zero 'g' fluid component replacement is described. A probe version of the MMDV is examined which simplifies the replacement of small components, such as instruments, in liquid lines. The MMDV is a rugged, compact, positive isolation valve that permits component attachment to fixed plumbing and provides component replacement without liquid spillage or air inclusion. Thus, servicing operations on liquid loops on-orbit can be accomplished without the need for evacuation and backfilling. Applications described include the 25 Kw power system, space operations center, orbital transfer vehicle, and permanent space-based vehicle liquid loops. (Author)

A80-43217 # **Anti-exposure suits in the VP community.** B. F. Withers (U.S. Navy, Pacific Fleet, San Diego, Calif.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-43.* 3 p. Members, $1.50; nonmembers, $3.00.

The paper considers engineering/operational interface involved in the design as regards human factors engineering, production, and maintenance of an appropriate quick-donning anti-exposure suit for the patrol community. Requirements are significantly different from those of the tactical air community. The patrol community flies longer missions into areas where rescue often cannot be effected for several hours. The longer missions make a constant wear garment totally impractical, but increased rescue time mandates that the garment be capable of sustaining life for many hours in water temperature less than 40 F. Drawing board systems are often impractical in the fleet situation. Systems often sacrifice maintainability for sophistication of function which must be viewed very critically; all of the above factors must be integrated to produce a reliable, effective anti-exposure suit for the patrol community. (Author)

A80-43218 # **The classification of spinal column deformities resulting from aircraft ejection forces.** L. E. Kazarian (USAF, Aerospace Medical Research Laboratories, Wright-Patterson AFB, Ohio). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-44.* 8 p. 10 refs. Members, $1.50; nonmembers, $3.00. AF Project 7231-11-01. (AMRL-TR-80-38)

Fractures, dislocations and fracture dislocations of the spinal column occur, with relative frequency, as the result of emergency escape from high performance USAF tactical aircraft. For purposes of vertebral column research, current methods for classifying operational injuries are inadequate. Injury identification and classification techniques vary to such a degree, comparison between injury types and mechanisms are invalid. The purpose of this paper is to formulate a consistent classification of spinal column injuries categorized according to engineering assessment and interpretation of roentgenographic changes in spinal column elements and regions. Spinal injury modes are classified according to direction of applied load with the resulting skeletal deformities. (Author)

A80-43219 * # **The factors influencing the formation of Li_2CO_3 from LiOH and CO_2.** S. H. Davis, Jr. (Rice University, Houston, Tex.) and L. D. Kissinger (NASA, Johnson Space Center, Houston, Tex.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-45.* 6 p. Members, $1.50; nonmembers, $3.00.

LiOH is used to remove CO_2 from the atmosphere in three environmental control systems of the Shuttle program, and the investigation of the performance dependent parameters for the CO_2 reaction with LiOH is reported. Emphasis is placed on LiOH quality acceptance criteria and on identifiying the relationships between the reaction rate and the following independent parameters: temperature, CO_2 partial pressure (PP), H_2O concentration in the solid, amount of remaining LiOH and the porosity of the LiOH pellets. Results showed that the reaction rate is proportional to the CO_2 PP for PP at least as high as 40 mm Hg (5330 N/sq m). It is also noted that a significant difference in the reactivity of wet and dry LiOH was not detected. J.P.B.

A80-43220 * # **Development of a preprototype thermoelectric integrated membrane evaporation subsystem for water recovery.** H. E. Winkler (NASA, Johnson Space Center, Houston, Tex.) and G. J. Roebelen, Jr. (United Technologies Corp., Hamilton Standard Div., Windsor Locks, Conn.). *American Society of Mechanical Engineers, Intersociety Environmental Systems Conference, San Diego, Calif., July 14-17, 1980, Paper 80-ENAs-46.* 8 p. Members, $1.50; nonmembers, $3.00.

A three-man urine water recovery preprototype subsystem using a new concept to provide efficient potable water recovery from waste fluids on extended duration space flights has been designed, fabricated, and tested. Low power, compactness, and gravity insensitive operation are featured in this vacuum distillation subsystem that combines a hollow fiber polysulfone membrane evaporator with a thermoelectric heat pump. Application and integration of these key elements have solved problems inherent in previous reclamation subsystem designs. The hollow fiber elements provide positive liquid/gas phase control with no moving parts other than a waste liquid recirculation pump and a product water withdrawal pump. Tubular membranes provide structural integrity, improving on previous flat sheet membrane designs. A thermoelectric heat pump provides latent energy recovery. (Author)

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STAR ENTRIES

N80-27067* National Aeronautics and Space Administration. Lyndon B. Johnson Space Center, Houston, Tex.
METHOD AND AUTOMATED APPARATUS FOR DETECTING COLIFORM ORGANISMS Patent
W. Preston Dill (Boeing Aerospace Co., Houston, Tex.), Rueben E. Taylor (Boeing Aerospace., Houston, Tex.), and Eldon L. Jeffers, inventors (to NASA) (Boeing Aerospace Co., Houston, Tex.) Issued 20 May 1980 14 p Filed 4 Apr. 1978 Sponsored by NASA
(NASA-Case-MSC-16777-1; US-Patent-4,204,037;
US-Patent-Appl-SN-893657; US-Patent-Class-435-3;
US-Patent-Class-23-230B; US-Patent-Class-204-195B;
US-Patent-Class-422-68; US-Patent-Class-435-32;
US-Patent-Class-435-34; US-Patent-Class-435-38;
US-Patent-Class-435-39; US-Patent-Class-435-289;
US-Patent-Class-435-290; US-Patent-Class-435-291;
US-Patent-Class-435-311; US-Patent-Class-435-316) Avail: US Patent and Trademark Office CSCL 06C

Method and automated apparatus are disclosed for determining the time of detection of metabolically produced hydrogen by coliform bacteria cultured in an electroanalytical cell from the time the cell is inoculated with the bacteria. The detection time data provides bacteria concentration values. The apparatus is sequenced and controlled by a digital computer to discharge a spent sample, clean and sterilize the culture cell, provide a bacteria nutrient into the cell, control the temperature of the nutrient, inoculate the nutrient with a bacteria sample, measures the electrical potential difference produced by the cell, and measures the time of detection from inoculation.
Official Gazette of the U.S. Patent and Trademark Office

N80-27068*# National Aeronautics and Space Administration, Washington, D. C.
CHANGE IN RADIOSENSITIVITY OF RATS DURING HYPOKINETIC STRESS
I. P. Chernov Jan. 1980 11 p refs Transl. into ENGLISH from Radiobiologiya (USSR), no. 4, 1978 p 574-578 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75968) Avail: NTIS HC A02/MF A01 CSCL 06C

The laws governing stress modification of radiation sickness in relation to hypokinetic stress were investigated. It was found that gamma irradiation (800 rad) of rats on the third day of exposure to hypokinesia increased the radiosensitivity of the animals which was determined by the survival rate and the dynamics of body weight and the weight of some internal organs. The same radiation dose was given on the 20th day of hypokinesia and on the third day of recovery from the 20 day hypokinesia decreased the radiosensitivity of rats. It is concluded that the variations in the radiosensitivity observed may be due to a stress effect of hypokinesia. R.E.S.

N80-27069*# Oregon Univ. Health Sciences Center, Portland. Dept. of Neurology.
COUNTERCURRENT DISTRIBUTION OF BIOLOGICAL CELLS Final Report, 1 Jan. 1978 - 31 Mar. 1979
D. E. Brooks Mar. 1979 46 p refs
(Contract NAS8-32817)
(NASA-CR-161487) Avail: NTIS HC A03/MF A01 CSCL 06C

A neutral polymer phase system consisting of 7.5 percent dextran 40/4.5 percent PEG 6, 0.11 M Na phosphate, 5 percent fetal bovine serum (FBS), pH 7.5, was developed which has a high phase droplet electrophoretic mobility and retains cell viability over many hours. In this and related systems, the drop mobility was a linear function of drop size, at least in the range 4-30 micron diameter. Applications of and electric field of 4.5 v/cm to a system containing 10 percent v/v bottom phase cleared the system more than two orders of magnitude faster than in the absence of the field. At higher bottom phase concentrations a secondary phenomenon intervened in the field driven separations which resulted in an increase in turbidity after clearing had commenced. The increase was associated with a dilution of the phase system in the chamber. The effect depended on the presence of the electric field. It may be due to electroosmotic flow of buffer through the Amicon membranes into the sample chamber and flow of phase system out into the rinse stream. Strategies to eliminate this problem are proposed. R.E.S.

N80-27070*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF SHARPLY LOWERED MUSCULAR ACTIVITY ON THE THYROID GLAND OF THE WHITE RAT
K. Bekishev Apr. 1980 9 p refs Transl. into ENGLISH from Izv. Akad. Kaz. Khim. SSR, (USSR) no. 2, Mar. - Apr. 1978 p 75-78 Transl. by Kanner (Leo) Associates, Redwood, Calif.
(Contract NASw-3199)
(NASA-TM-76114) Avail: NTIS HC A02/MF A01 CSCL 06C

The effect of hypokinesia on the thyroid gland of 200 white rats was studied. The rats were kept in 16x6x6 cm cages for 90 days. The functional activity of the thyroids increased after 24 hrs of partial immobilization and peaked after 15 days. After 30 days of immobilization, the functional activity returned to normal in one third of the test animals and after 60 days in all animals. After 15 days of immobilization, the test animals began to lose weight (in comparison to the controls) and remained underweight for the rest of the test period (up to 90 days). When returned to normal conditions, they caught up with and even overtook in weight the control animals after about 1 month. All changes produced by hypokinesia were reversible after 1 month. Author

N80-27071*# National Aeronautics and Space Administration, Washington, D. C.
THE EFFECT PRODUCED BY PHENOBARBITAL, SEX HORMONE AND BY CASTRATION ON THE DEVELOPMENT OF GASTRIC MUCOSA DESTRUCTION DUE TO ELECTRIZATION OF IMMOBILIZED RATS
P. S. Botsolin May 1980 7 p refs Transl. into ENGLISH from Farmakol. Toksikol. (USSR), v. 31, no. 2, 1968 p 197-199 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(NASA-TM-76156) Avail: NTIS HC/ A02/MF A01 CSCL 06C

The action of phenobarbital on the development of gastric mucosa destruction in rats, brought on through three hours of electrization of immobilized animals, was studied. The evidence showed that phenobarbital exerts a preventive action on the development of destructive lesions affecting the gastric mucosa in non-castrated rats of both sexes, in non-castrated males receiving testosterone propionate, as well as in castrated males and non-castrated females receiving diethylstilbestrol propionate. In castrated female rats, however, phenobarbital proved to be of little effect. Author

N80-27072* National Aeronautics and Space Administration, Pasadena Office, Calif.
SIMULTANEOUS MUSCLE FORCE AND DISPLACEMENT TRANSDUCER Patent
Cyril Feldstein (JPL), Gilbert W. Lewis (JPL), and Virgil H. Culler, inventors (to NASA) (JPL) Issued 27 May 1980 5 p Filed 30 Sep. 1977 Supersedes N80-12730 (18 - 03, p 0376) Sponsored by NASA
(NASA-Case-NPO-14212-1; US-Patent-4,204,544;
US-Patent-Appl-SN-838308; US-Patent-Class-128-642;
US-Patent-Class-128-774; US-Patent-Class-128-782;
US-Patent-Class-33-125R; US-Patent-Class-73-781;
US-Patent-Class-338-2) Avail: US Patent and Trademark Office CSCL 06B

A myocardial transducer for simultaneously measuring force and displacement within a very small area of myocardium is disclosed. The transducer comprised of an elongated body forked

at one end to form an inverted Y shaped beam with each branch of the beam constituting a low compliant tine for penetrating the myocardium to a predetermined depth. Bonded to one of the low compliance tines is a small piezoresistive element for converting a force acting on the beam into an electrical signal. A third high compliant tine of the transducer, which measures displacement of the myocardium in a direction in line with the two low compliant tines, is of a length that just pierces the surface membrane. A small piezoresistive element is bonded to the third tine at its upper end where its bending is greatest. Displacement of the myocardium causes a deformation in curvature of the third tine, and the second small piezoresistive element bonded to the surface of its curved end converts its deformation into an electrical signal.

Official Gazette of the U.S. Patent and Trademark Office

N80-27073*# National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt, Md.

AN IMPLANTABLE ELECTRICAL DEVICE Patent Application

Murzban D. Jhabvala, inventor (to NASA) Filed 27 May 1980 12 p

(NASA-Case-GSC-12560-1; US-Patent-Appl-SN-153246) Avail: NTIS HC A02/MF A01 CSCL 06B

A fully implantable and self-contained therapeutic device for stimulating the regeneration of severed nerves by electrical energy is disclosed. The device is composed of a flexible electrode array for surrounding damaged nerves and a signal generator for driving the electrode array with periodic electrical impulses of nanoampere magnitude to induce regeneration of the damaged nerves. NASA

N80-27074*# National Aeronautics and Space Administration, Washington, D. C.

CHANGES IN LEUKOCYTE STABILITY IN HYPODYNAMIA

I. I. Federov, Z. P. Federova, Ye. N. Pekus, and T. L. Sakun Jan. 1980 8 p refs Transl. into ENGLISH from Vrach. Delo. (USSR), Apr. 1972, p 44-48 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-2791)

(NASA-TM-75944) Avail: NTIS HC A02/MF A01 CSCL 06P

Leukocytolysis was determined under conditions of hypokinesia of 10 days to 1 month duration in healthy persons and in experiments on albino rats of 1 month duration. It was found that prolonged restriction of movement resulted, both in clinical and experimental conditions, in a considerable increase of leukocytolysis (by two-three-fold). Leukocytolysis also continued for several days after cessation of hypokinesia. R.E.S.

N80-27075*# National Aeronautics and Space Administration. Langley Research Center, Langley Station, Va.

ERROR ANALYSIS AND CORRECTIONS TO PUPIL DIAMETER MEASUREMENTS WITH LANGLEY RESEARCH CENTER'S OCULOMETER

C. L. Fulton (Purdue Univ.) and R. L. Harris, Jr. May 1980 17 p refs

(NASA-TM-81806) Avail: NTIS HC A02/MF A01 CSCL 06B

Factors that can affect oculometer measurements of pupil diameter are: horizontal (azimuth) and vertical (elevation) viewing angle of the pilot; refraction of the eye and cornea; changes in distance of eye to camera; illumination intensity of light on the eye; and counting sensitivity of scan lines used to measure diameter, and output voltage. To estimate the accuracy of the measurements, an artificial eye was designed and a series of runs performed with the oculometer system. When refraction effects are included, results show that pupil diameter is a parabolic function of the azimuth angle similar to the cosine function predicted by theory: this error can be accounted for by using a correction equation, reducing the error from 6% to 1.5% of the actual diameter. Elevation angle and illumination effects were found to be negligible. The effects of counting sensitivity and output voltage can be calculated directly from system documentation. The overall accuracy of the unmodified system is about 6%. After correcting for the azimuth angle errors, the overall accuracy is approximately 2%. Author

N80-27076*# National Aeronautics and Space Administration, Washington, D. C.

SOME PROBLEMS OF HUMAN ADAPTATION AND ECOLOGY UNDER THE ASPECT OF GENERAL PATHOLOGY

V. P. Kaznacheyev Jul. 1980 15 p refs Transl. into ENGLISH from Vestn. Akad. Med. Nauk SSSR (USSR), no. 11, Nov. 1979 p 51-57 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(NASA-TM-76095) Avail: NTIS HC A02/MF A01 CSCL 06S

The main problems of human adaptation at the level of the body and the population in connection with the features of current morbidity of the population and certain demographic processes are analyzed. The concepts of health and adaptation of the individual and human populations are determined. The importance of the anthropo-ecological approach to the investigation of the adaptation process of human populations is demonstrated. Certain features of the etiopathogenesis of diseases are considered in connection with the population-ecological regularities of human adaptation. The importance of research on general pathology aspects of adaptation and the ecology of man for planning, and organization of public health protection is discussed. Author

N80-27077*# National Aeronautics and Space Administration, Washington, D. C.

THE USE OF ANTIGRAVITY SUITS IN THE TREATMENT OF IDIOPATHIC ORTHOSTATIC HYPOTENSION

K. Landmark and S. Kravik Apr. 1980 8 p refs Transl. into ENGLISH from Tidsskr. Norske Laegforen. (Norway), v. 99, no. 30, 1979 p 1530-1531 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-75804) Avail: NTIS HC A02/MF A01 CSCL 06E

Idiopathic orthostatic hypotension is an uncommon disease characterized by a drop in blood pressure when going from a recumbent to a standing position. Treatment by medication generally produces poor results. Three patients at the Royal Hospital in Oslo were treated with antigravity suits and all were able to maintain adequate blood pressures in the standing position. One patient improved dramatically and was able to take short walks while wearing the suit. The two other patients, however, felt that wearing the suits eventually became uncomfortable. This treatment represents a useful treatment alternative for intractable cases. Author

N80-27078*# National Aeronautics and Space Administration, Washington, D. C.

THE EFFECT OF HYPODYNAMIA ON MINERAL AND PROTEIN METABOLISM IN CALCIFIED TISSUES OF THE MAXILLODENTAL SYSTEM (EXPERIMENTAL RADIOISOTOPE STUDY)

A. A. Prokhonchukov, Ye. A. Kovalenko, A. G. Kolesnik, Yu. I. Kondratyev, and N. A. Ilyushko Jul. 1980 15 p refs Transl. into ENGLISH from Stomatologiya (USSR), v. 49, no. 4, 1970 p 1-6 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prepared by Central Dental Research Inst., Moscow

(Contract NASw-3199)

(NASA-TM-75998) Avail: NTIS HC A02/MF A01 CSCL 06P

Mineral and protein metabolism was studied in experiments on 60 white rats, using P-32 and Ca-45 uptake in the mineral fractions, 2C-14-glycine in the protein fractions, and P-32 in both fractions of calcified tissues as indices over a 100 day period of experimental hypodynamia. Combined alterations in mineral and protein metabolism occurred in the calcified tissues of the experimental animals. The most pronounced changes were found in P-32 and 2C-14-glycine metabolism. In the incisors and femoral bones, these alterations occurred in two phases: P-32 and 2C-14-glycine uptake first increased, then decreased. Changes in Ca-45 metabolism were less pronounced, particularly in the initial period of the experiment. A marked reduction in P-32, Ca-45, and 2C-14-glycine uptake was found in various

fractions of the calcified tissues on the 100th day of experimental hypodynamia. Author

N80-27079*# National Aeronautics and Space Administration, Washington, D. C.
THE BEHAVIOR OF FATTY ACIDS IN THE BLOOD PLASMA OF MONKEYS FOLLOWING EXPOSURE TO SHORT TERM STRESSES
M. L. Michailov, U. Gnuechtel, S. Nitschkoff, R. Baumann, and G. Gnauck May 1980 8 p refs Transl. into ENGLISH from Acta Biol. Med. Ger. (East Germany), v. 32, 1974 p 675-680 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prepared by East German Acad. of Sci.
(NASA-TM-76151) Avail: NTIS HC A02/MF A01 CSCL 06P

Monkeys exposed to short term stresses (immobilization, jealousy) were found to develop hyperlipacidemia with a rise in concentration of unsaturated fatty acids in blood plasma, especially of oleic acid, and a relative decrease of saturated free fatty acids, chiefly of palmitinic acid. This finding was more pronounced under immobilization stress than in the jealousy situation. Meanwhile, the composition of triglycerides did not change essentially under the conditions used. Author

N80-27080# Aerospace Medical Research Labs., Wright-Patterson AFB, Ohio.
HUMAN RESPONSE TO HYPOXIA-MOTION SICKNESS STRESS AS A PREDICTOR OF THE SPACE SICKNESS SYNDROME
Aaron V. Barson, Jr. Oct. 1979 6 p refs Presented at Intern. Aerospace Federation, Manila, 8-12 Oct. 1979 Sponsored by AE
(AF Proj. 7231)
(AD-A080306; AMRL-TR-79-86) Avail: NTIS HC A02/MF A01 CSCL 06/19

The change observed during the hypoxia runs supports the hypothesis that hypoxic states lower human tolerance to vestibular stimuli. The frequency of occurrence of symptoms in this study is encouraging since little change in presentation was found between the normoxia and hypoxia runs. Large variations in the symptom presentations would have indicated that hypoxia symptoms were being misread as motion sickness symptoms, thereby skewing the results. From these results it is obvious that a significant research effort is needed to futher delineate and verify the various aspects of this theory. Additional human investigations in one-g and zero-g are needed to verify that the proposed hemodynamic changes and oxygenation parameters potentiates or causes space sickness. Animal studies will be needed to quantify the type and amount of circulatory disruption and hypoxia caused by zero-g exposure. If hypoxia proves to be implicated in the space sickness syndrome, it may be possible to use this hypoxia-motion sickness stress response as an indicator (in earth gravity) of a person's susceptibility to zero-g space sickness. GRA

N80-27081# California Univ., Berkeley. Lawrence Berkeley Lab. Physics Computer Science and Mathematics Div.
MAGNETIC FIELD ON HUMANS: EPIDEMIOLOGICAL STUDY DESIGN, PART 2
John S. Colonias Sep. 1979 20 p refs
(Contract W-7405-eng-48)
(LBL-9357-Pt-2) Avail: NTIS HC A02/MF A01

A study, designed to investigate the epidemiological health effects resulting from occupational magnetic field exposure produced by various nuclear instruments such as cyclotrons, bubble chambers, and spectrometers was previously described. The methodology involved in determining the magnetic field exposure to such instruments is described. DOE

N80-27082# Rensselaer Polytechnic Inst., Troy, N. Y.
PRIMARY PRODUCTIVITY, HETEROTROPHY, METABOLIC INDICATORS OF STRESS AND INTERACTIONS IN ALGAL-BACTERIAL MAT COMMUNITIES AFFECTED BY A FLUCTUATING THERMAL REGIME Ph.D. Thesis
David Lawrence Tison 1980 44 p refs
(Contract EY-76-C-09-0001)
(DP-MS-80-14) Avail: NTIS HC A03/MF A01

Thermal habitats in effluent cooling waters from production nuclear reactors at the Savannah River Plant are unlike natural to ambient temperatures for unpredictable lengths of time. Rates of primary production, glucose heterotrophy, and the composition of algal-bacterial mat communities growing along a thermal gradient from about 50 to 35 C during periods of reactor operation were studied. Cyanobacteria were the only photoautotrophs in mat communities above 40 C while cyanobacteria and eucaryotic algae comprised the photoautotrophic component of mat communities below 40 C. The heterotrophic component of these communities above 40 C was made up to stenothermic and eurythermic thermophilic bacteria while both eurythermic thermophiles and mesophilic bacteria were found in communities below 40 C. Results of temperature shift experiments indicated that the short-term response of the photoautotrophic component of these communities to thermal stress was an increase in the percentage of photosynthate released extracellularly. DOE

N80-27083# *Massachusetts General Hospital, Boston.*
CdTe AMBULATORY VENTRICULAR FUNCTION MONITOR
J. L. Lazewatsky, N. M. Alpert, R. H. Moore, C. A. Boucher, H. W. Strauss, G. Entine (Radiation Monitoring Devices, Inc.), R. Chaney (Ohio Nuclear Inc.), and R. Schreiner (Ohio Nuclear Inc.) 1979 5 p refs Presented at IEEE Nucl. Sci. Symp., San Francisco, 17 Oct. 1979
(Contract EY-76-C-02-2541)
(CONF-791037-26) Avail: NTIS HC A02/MF A01

A prototype device consisting of two arrays of CdTe detectors, ECG amplifiers and gate, microprocessor, and tape recorder was devised to record simultaneous ECG and radionuclide blood pool data from the left ventricle for extended periods during normal activity. The device is intended to record information concerning both normal and abnormal physiology of the heart and to permit the evaluation of the pharmaceuticals under everyday conditions. Preliminary results indicate that the device is capable of recording and reading out data from both phantoms and patients. DOE

N80-27084# Chicago Univ., Ill. Dept. of Radiology.
MODIFIED CONJUGATE COUNTING TECHNIQUE FOR QUANTITATIVE MEASUREMENT OF RADIOACTIVITY IN VIVO
B. M. W. Tsui, C.-T. Chen, N. J. Yasillo, C.J. Ortega, and D. B. Charleston 1979 24 p Presented at the 21st Ann. Meeting of the AAPM, Atlanta, 29 Jul. - 2 Aug. 1979 Prepared in cooperation with Franklin McLean Mem. Res. Inst., Chicago
(Contract EY-76-C-02-0069)
(CONF-790782-1) Avail: NTIS HC A02/MF A01

A modified conjugate counting method is presented for studying biochemical transformations in health and disease, in making realistic radiation-absorbed dose estimates, and in developing clinical procedures indicative of abnormal functions. A new instrument design improves the accuracy to within 5%. DOE

N80-27085# National Physical Lab., Teddington (England). Div. of Electrical Science.
DEVELOPMENT OF A METHOD FOR THE TRACEABLE CALIBRATION OF DEFIBRILLATOR ENERGY METERS
J. R. Stockton and R. C. Smith Aug. 1979 41 p refs
(NPL-DES-55) Avail: NTIS HC A03/MF A01

The development, intercomparison and agreement of two independent, traceable methods: one calorimetric and one digital sampling; for the measurement of the energy of cardiac defibrillator pulses, are discussed. The use of the sampling method to calibrate a defibrillator energy meter, a commercial instrument used for the routine calibration of defibrillators is described. Some observations on methods of making future measurements on energy meters and on possible designs for digital energy meters are included. Author (ESA)

N80-27086# Technische Universitaet, Brunswick (West Germany). Sonderforschungsbereich 58.

HEART RATE VARIABILITY, PILOT WORKLOAD, TASK DIFFICULTY, TRACKING

Fred Volker Schick and Hans Radke Jul. 1979 38 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-653) Sponsored by DFVLR
(DFVLR-FB-79-33) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 8.60

The usefulness of measurements of heart rate variations for the assessment of pilot workload was studied in a laboratory experiment. Statistical methods were used to analyze the data. The heart rate variations were studied as a function of standard deviations, sums of absolute differences, and frequencies of reversals of instantaneous heart rate. Author (ESA)

N80-27087# Southampton Univ. (England). Inst. of Sound and Vibration Research.

THE EFFECT OF HEARING PROTECTORS ON THE PERCEPTION OF WARNING AND INDICATOR SOUNDS: A GENERAL REVIEW

P. A. Wilkins and A. M. Martin Aug. 1978 217 p refs Sponsored by UK Health and Safety Executive
(ISVR-TR-98) Avail: NTIS HC A10/MF A01

The literature on the auditory effects of wearing hearing protectors was reviewed. A conceptual model of the perception process suggests that the three components, audibility, attention demand and recognition are of importance. Several suggested methods of predicting the audibility of complex sounds in noise are compared and their limitations highlighted. Although a number of studies consider the attention demand of warning sounds, it is concluded that they do not allow any firm conclusions on the effect of inattention to be drawn. Inconsistent use of hearing protectors could, via a temporary shift in the threshold of hearing, result in signals being inaudible when subsequently wearing hearing protectors. It is hypothesized that by reducing the loudness and changing the spectral character of sounds, hearing protectors may impair their attention demand value and their recognition by the wearer. An evaluation of the situation of workers who suffer from an existing noise-induced hearing loss suggests that when wearing hearing protection their perception of sounds in noise may be governed by their doubly elevated absolute thresholds rather than the masker threshold criteria relevant to those with normal hearing. Author (ESA)

N80-27088# Bureau of Radiological Health, Rockville, Md. Div. of Electronic Products.

AN EVALUATION OF MICROWAVE EMISSIONS FROM SENSORMATIC ELECTRONIC SECURITY SYSTEMS Final Report

Howard I. Bassen Feb. 1980 8 p refs
(PB80-155385; DHEW/PUB-FDA-80-8106) Avail: NTIS HC A02/MF A01 CSCL 13L

The concern over potential microwave radiation hazards associated with models of the Sensormatic Electronic Security System has recently been expressed by various groups in the public health, labor, and industrial sectors. Because of this concern, a reevaluation of these specific devices was initiated to confirm Bureau of Radiological Health measurements taken on early models of this device in 1971. The findings of both the early survey, and this more recent one, confirm the BRH's position that emissions from the Sensormatic devices fall well below current U. S. guidelines for permissible exposure of humans to microwave radiation. GRA

N80-27089# Lister Hill National Center for Biomedical Communications, Bethesda, Md. Communications Engineering Branch.

ADAPTIVE DELTA MODULATION FOR TELEPHONE BIOTELEMETRY OF ECG (ELECTROCARDIOGRAPH) Final Report

Surachai Suthasinekul Jun. 1979 57 p refs
(PB80-160773; LHNCBC-79-21) Avail: NTIS HC A04/MF A01 CSCL 06B

Signal processing techniques and their applications in biomedical communications were investigated. Emphasis was on the application of digital coding techniques in telephone biotelemetry of electrocardiograph (EEG) signals. Existing techniques for telephone biotelemetry are briefly reviewed, their shortcomings are identified, and some possible solutions to the problems are discussed. One particular approach is the application of adaptive delta modulation (ADM) for digital encoding of ECG. The design and implementation of such an ADM system in the laboratory indicates that three ADM-encoded ECGs can be time-division multiplexed and transmitted through one telephone channel. GRA

N80-27090*# National Aeronautics and Space Administration, Washington, D. C.

COMMUNITY REACTIONS TO AIRCRAFT NOISE IN THE VICINITY OF AIRPORT: A COMPARATIVE STUDY OF THE SOCIAL SURVEYS USING INTERVIEW METHOD

Yasutaka Osada Apr. 1980 18 p refs Transl. into ENGLISH of Koshu Eiseiin Kenkyu Hokoku (Tokyo), v. 20, no. 2, 1971 p 119-127 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-75439) Avail: NTIS HC A02/MF A01 CSCL 05J

A comparative study was performed on the reports of community reactions to aircraft noise. The direct and immediate reactions to aircraft noise such as perceived noisiness, interference with conversations, etc. and various emotional influences were most remarkable; indirect and long term influences such as disturbance of mental work and physical symptoms were less remarkable. Author

N80-27091*# Boeing Commercial Airplane Co., Seattle, Wash.

NASA TLA WORKLOAD ANALYSIS SUPPORT. VOLUME 2: METERING AND SPACING STUDIES VALIDATION DATA

James L. Sundstrom Jul. 1980 402 p refs
(Contract NAS1-13741)
(NASA-CR-3239) Avail: NTIS HC A18/MF A01 CSCL 05H

Four sets of graphic reports--one for each of the metering and spacing scenarios--are presented. The complete data file from which the reports were generated is also given. The data was used to validate the detail task of both the pilot and copilot for four metering and spacing scenarios. The output presents two measures of demand workload and a report showing task length and task interaction. R.E.S.

N80-27092*# National Aeronautics and Space Administration, Washington, D. C.

THE MORALE CLIMATE OF THE CREW (FROM OBSERVATIONS OF A SUBMARINE DOCTOR)

V. Kulikov Jul. 1980 8 p Transl. into ENGLISH from Morsk. Sb. (USSR), no. 7, Jul. 1979 p 35-38 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-76094) Avail: NTIS HC A02/MF A01 CSCL 05J

Personnel interrelationships as affected by sociopsychological compatibility are examined. Practical examples are cited. The principle of complementary temperaments is explored. Stress is laid upon the need for creating conditions that will permit personnel to deal with compatibility problems during the prevoyage preparation period and especially during the confining conditions of a long voyage. J.M.S.

N80-27093*# Boeing Commercial Airplane Co., Seattle, Wash.

NASA TLA WORKLOAD ANALYSIS SUPPORT. VOLUME 3: FFD AUTOPILOT SCENARIO VALIDATION DATA Final Report

James L. Sundstrom Jul. 1980 361 p
(Contract NAS1-13741)
(NASA-CR-3240) Avail: NTIS HC A16/MF A01 CSCL 05H

The data used to validate a seven time line analysis of forward flight deck autopilot mode for the pilot and copilot for NASA B737 terminal configured vehicle are presented. Demand workloads are given in two forms: workload histograms and workload summaries (bar graphs). A report showing task length and task interaction is also presented. R.E.S.

N80-27094# Air Force Human Resources Lab., Brooks AFB, Tex. Flying Training Div.

APPLIED BEHAVIOR ANALYSIS IN FLYING RESEARCH Interim Report, Jun. - Aug. 1978

Jon S. Bailey (Florida State Univ., Tallahassee) and Ronald G. Hughes *Jan. 1980 17 p refs*

(AF Proj. 1123)

(AD-A081750; AFHRL-TR-79-38) Avail: NTIS HC A02/MF A01 CSCL 05/9

Research developments in learning theory over the past 50 years have led to principles of behavior which have been shown in innumerable applied settings to be valuable in analyzing and modifying human behavior. When applied to flying training using simulators, these principles suggest that a significant contribution could be made in improving the way in which instructor pilots teach new students via more effective use of simulator functions. In addition, flying skills could probably be acquired more readily if tasks were presented in a more systematic manner, taking the principles of learning into account. When the simulator is conceptualized as merely an inferior copy of an aircraft, its potential as a teaching device (perhaps superior to the actual plane, in this regard) is likely to be overlooked. Thus, a behavioral analysis of optimal conditions of learning would make a major contribution to both the design and use of current and future flight simulators. In this report, an attempt is made to elucidate the basic principles of behavior and to relate them to the task of improving flying training. GRA

N80-27095# Deutsche Forschungs- und Versuchsanstalt fuer Luft- und Raumfahrt, Oberpfaffenhofen (West Germany). Inst. fuer Physik der Atmosphaere.

THE INFLUENCE OF THE FLIGHT ALTITUDE AND THE LIMITATION OF THE FIELD OF VIEW ON THE VISIBILITY OF TARGETS ON THE GROUND AND THE MAXIMUM VISIBILITY FLIGHT ALTITUDE

Hans-Eberhard Hoffmann Sep. 1979 44 p refs In GERMAN; ENGLISH summary Report will also be announced as translation (ESA-TT-654)

(DFVLR-FB-79-35; ESA-TT-654) Avail: NTIS HC A03/MF A01; DFVLR, Cologne DM 8,60

The visibility of targets on the ground for observers in an aircraft was studied. The maximum flight altitudes at which detection, recognition, or identification of ground targets is still possible were calculated under the assumption that the visibility distance is a logarithmic function of the altitude. The constants of this function were determined experimentally. Author (ESA)

N80-27979 California Univ., Berkeley.

TRANSIENT DIFFUSION IN MULTI-LAYER BIOLOGICAL TISSUE Ph.D. Thesis

Joseph Rasson 1979 126 p

Avail: Univ. Microfilms Order No. 8014852

The oxygen tension profile in the human cornea while a soft contact lens is in situ was investigated to answer some of the questions concerning the clinical application of soft contact lenses. A mathematical model of the cornea contact lens system was developed to predict the transient response of a Clark-type oxygen sensor pressed into the lens. Due to the lack of data on human corneal diffusion parameters, an analysis of the effect of different parameters on the oxygen tension profile was performed. The results indicate that the diffusion properties of corneal epithelium, specifically, its oxygen up-take rate and thickness, have dominant effects on oxygen tension under the lens. These findings could prove useful in determining which individuals can *and cannot wear soft contact lenses. The diffusion property of* the contact lens, its oxygen transmissibility, also has a significant effect on the oxygen tension under the lens. The agreement between the experimental results and the mathematical model indicates that the diffusion properties of the human cornea which exist in the literature are a reasonable estimation of actual normal diffusion parameters. Dissert. Abstr.

N80-27980 California Univ., Berkeley.

INSTRUMENTATION FOR THE MEASUREMENT OF VISCOSITY AND FLOW OF BIOLOGICAL FLUIDS Ph.D. Thesis

Lawrence Eugene Crooks 1979 223 p

Avail: Univ. Microfilms Order No. 8014642

Several ways to use nuclear magnetic resonance (NMR) to measure properties of fluids were investigated with emphasis on the measurement of fluid flow velocity. The technique also provided a measure of molecular self diffusion which was converted to the fluid's viscosity. The flow characteristic measured was a velocity distribution function which relates the fraction of fluid flowing to the fluid velocity. It is shown that a multiple pulse NMR sequence can be used to determine the velocity distribution. A self diffusion measurement gives the diffusion coefficient of a whole sample, whether it is stationary or flowing. It is also shown that varying the experiment timing, restricted diffusion can be observed and the size of biological miscelles can be estimated. The results of a study of diffusion in cervical mucus are presented. Results indicate that NMR relaxation time can also be used to determine the hemaglobin concentration in whole blood. Results of this type of measurement on leukemic whole blood and various blood fractions are presented. Dissert. Abstr.

N80-27981*# National Aeronautics and Space Administration, Washington, D. C.

EXPERIMENTAL GASTRIC ULCERS INDUCED BY IMMOBILIZATION AND ELECTRIC SHOCK OF RATS AND THEIR PHARMACOTHERAPY

O. N. Zabrodin May 1980 7 p refs Transl. into ENGLISH from Farmakol. Toksikol. (USSR), v. 28, no. 6, 1965 p 717-719 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-76157) Avail: NTIS HC A02/MF A01 CSCL 06C

The mechanism of development of experimental gastric ulcers, induced in rats by combined immobilization and electric shock, was analyzed pharmacologically with peripheral neurotropic agents. It is concluded that: (1) The most marked preventive effect in the development of the experimentally induced gastric ulcers was displayed by agents capable of blocking the ascending activation system of the reticular formation. (2) Sympathetic fibers, which disrupt the trophism of the gastric wall, form the efferent portion of the reflex arc. (3) Gastric secretion does not appear to be the primary cause of ulceration. R.E.S.

N80-27982*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF CENTRAL NEUROTROPIC SUBSTANCES ON THE HYPOPHYSISADRENAL CORTEX SYSTEM DURING IMMOBILIZATION OF ANIMALS

V. Ye. Ryzhenkov May 1980 9 p refs Transl. into ENGLISH from Farmakol. Toksikol. (USSR), v. 31, no. 5, 1968 p 545-548 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-76158) Avail: NTIS HC A02/MF A01 CSCL 06C

The immobilization of guinea pigs for 5, 12, 24 and 48 hours, by securing to a slab, results in a persistent rise of the blood plasma 17-oxycorticosteroid concentration. Repeated administration of phenobarbital (50 mg/kg) and of the sodium salt of gamma-oxybutyric acid (500 mg/kg), as well as the combined administration of central m- and n-cholinolytics with small doses of phenobarbital tends to inhibit activation of the adrenal cortex during 48 hour immobilization of the animals. Repeated administration of aminazine (20 mg/kg) tends to decrease activation of the adrenal cortex. The administration of reserpine (0.1-5 mg/kg) 12-18 hours before immobilization of guinea pigs increases the response of the hypophysis-adrenal cortex system. Author

N80-27983*# National Aeronautics and Space Administration, Washington, D. C.

OXYGEN CONSUMPTION OF ANIMALS UNDER CONDITIONS OF HYPOKINESIA

Ye. N. Loginova, A. I. Volozhin, I. G. Krasnyku, and Ye. A. Stroganova May 1980 11 p refs Transl. into ENGLISH from Patrol. Fiziol. Eksp. Ter. (USSR), no. 4, Jul.-Aug. 1975 p 32-36 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original Doc. prepared by Med. Stomatological Inst., Moscow

(Contract NASw-3198)
(NASA-TM-76167) Avail: NTIS HC A02/MF A01 CSCL 06C

The influence of hypokinesia on the oxygen consumption of rats, dog, and squirrels was investigated. Three periods of gaseous exchange were revealed in rats under conditions of a limited motor activity. During the first 10-15 days O2 consumption displayed a sharp elevation; on the 20th-30th day, it became stabilized at a higher level (in comparison with control) and it sharply rose again on the 40th-100th day. In dogs, hypokinesia produced a reduction of O2 consumption and then a tendency to its elevation was seen. A short period of physical exercises in squirrels after hypokinesia led to increased oxygen consumption at rest. R.E.S.

N80-27984*# National Aeronautics and Space Administration, Washington, D. C.

MECHANISMS OF WATER-SALT METABOLISM DISTURBANCES IN DOGS SUBJECTED TO SIX MONTH HYPOKINESIA

V. I. Korolkov, Ye. A. Kovalenko, V. P. Krotov, N. A. Ilyushko, V. A. Kondratyeva, and Yu. I. Kondratyev May 1980 9 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 6, 1977 p 32-35 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-76170) Avail: NTIS HC A02/MF A01 CSCL 06C

Water-salt metabolism in dogs during prolonged restricted motor activity (hypokinesia) was investigated. It was found that hydration occurred and fluid was redistributed between the extra- and intra-cellular sectors. Also, electrolyte excretion rose, and magnetism and calcium metabolism changed significantly. It is concluded that the forces caused by muscle strain proper (which was decreased under conditions of hypokinesia) influence the state of bone metabolism. R.E.S.

N80-27985*# National Aeronautics and Space Administration, Washington, D. C.

BIOLOGICAL AND AERODYNAMIC PROBLEMS WITH THE FLIGHT OF ANIMALS

Erich V. Holst and Dietrich Kuchemann May 1980 37 p refs Transl. into ENGLISH from die Naturwissencchaften (Geottigen, West Germany), v. 24/25, 13 Jun. 1941 p 348-362 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-75337) Avail: NTIS HC A03/MF A01 CSCL 06C

Biological and aerodynamic considerations related to birds and insects are discussed. A wide field is open for comparative biological, physiological, and aerodynamic investigations. Considerable mathematics related to the flight of animals is presented, including 20 equations. The 15 figures included depict the design of bird and insect wings, diagrams of propulsion efficiency, thrust, lift, and angles of attack and photographs of flapping wing free flying wing only models which were built and flown. L.F.M.

N80-27986*# National Aeronautics and Space Administration, Washington, D. C.

THE GROWTH OF BIRDWINGS

K. Meunier May 1980 46 p refs Transl. into ENGLISH from Leipzig Abetilung, (East Germany), v. 161, no. 3-4, 1959 p 444-482 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by State Bird Protection Station, Schleswig-Holstein, West Germany
(Contract NASw-3199)
(NASA-TM-75821) Avail: NTIS HC A03/MF A01 CSCL 06C

Growth and order allometry is defined and applied to the growth of bird effects of negative wing allometry discussed with regard to body size and flight power. Transposition and evolutionary significance are explained. R.E.S.

N80-27987*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF IMMOBILIZATION ON THE EEG OF THE BABOON. COMPARISON WITH TELEMETRY RESULTS FROM UNRESTRICTED ANIMALS

J. Bert and H. Collomb Apr. 1980 5 p refs Transl. into ENGLISH from Compt. Rend. Soc. Biol. (France) v. 159, no. 5, 1965 p 1202-1204 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(NASA-TM-76137) Avail: NTIS HC A02/MF A01 CSCL 06C

The EEG of the baboon was studied under two very different sets of conditions: 37 were totally immobolized while 12 were studied in their free movements with 4 channel telemetry. For the immobilzed, 3 stages were described: (1) activation, record desynchronized; (2) rest with 13-15 cm/sec rhythm, like the human alpha rhythm stage but with eyes open or closed; (3) relaxation with a decrease in 13-15 rhythm and the appearance of 5-7 cm/sec theta waves, eyelids closed, animal apparently sleeping. For the free animals the rest stage appeared when the animal's attention was not directed anywhere and there was no relaxation stage. It is concluded that the EEG pattern of the immobilized animal that was described as the 'relaxation' stage really represents a special functional state which one must distinguish clearly from the physiological stages of sleep. R.E.S.

N80-27988*# National Aeronautics and Space Administration, Washington, D. C.

CALORIGENIC EFFECT OF ADRENALINE IN RATS UNDER CONDITIONS OF RESTRICTED MOTOR ACTIVITY

L. Tomaszewska, H. Kaciuba-Uscilko, and S. Kozlowski Jun. 1980 8 p refs Transl. into ENGLISH from Artif. Satell. (Poland), 1/2, 1973 p 75-80 Presented at Symp. on Cosmic Biol. and Med., Warsaw, 12-17 Jun. 1972 Translation was announced as A74-20558 Transl. by Scientific Translation Service, Santa Barbara, Calif.
(Contract NASw-3198)
(NASA-TM-76192) Avail: NTIS HC A02/MF A01 CSCL 06C

In previous studies, it was demonstrated that long term restricted motor activity in rats induces a decrease in body weight, an increase in release of adrenaline, and a decrease in the release of noradrenaline with the urine, as well as a reduction in activity of the thymus gland and level of thyroxin in the blood. At the same time, a decrease was found in the internal body temperature that was accompanied by an increase in the rate of metabolism in the state of rest. An investigation is presented which attempts to clarify whether the calorigenic effect of adrenaline under conditions of increased metabolism in the period of immobility is exposed to changes. R.E.S.

N80-27989*# National Aeronautics and Space Administration, Washington, D. C.

DISPLACEMENT OF PLASMA PROTEIN AND CONDUCTION VELOCITY IN RATS UNDER ACTION OF ACCELERATION FORCES AND HYPOKINESIA

S. Baranski, Z. Edelwejn, and M. Wojtkowiak Jun. 1980 10 p refs Transl. into ENGLISH from Postepy Astronautyki (Poland), v. 5, no. 2, 1972 p 61-70 Original language document annouced as A73-17769 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Military Academy of Aviation Medicine, Warsaw
(NASA-TM-76195) Avail: NTIS HC A02/MF A01 CSCL 06C

The permeability of capillary vessels was investigated in order to determine if acceleration alone or following prolonged hypokinesia would induce changes in the vascular wall leading to the penetration by I-albumins and/or proteins with larger molecules. In rats undergoing action of +5 Gz accelerations, no increase in vascular permeability, as tested with the use of (Cr-5k)-globulin, was demostrated. In rats immobilized for 4 weeks before centrifugation, rather weak migration of (Cr-51)-globulin from the vessels was observed. Immobilization resulted also in lowering of conduction velocity in the sciatic nerve. R.E.S.

N80-27990*# National Aeronautics and Space Administration, Washington, D. C.
EXPERIMENTAL CORONARY SCLEROSIS INDUCED BY IMMOBILIZATION OF RABBITS: A NEW MODEL OF ARTERIOSCLEROSIS
V. V. Tyavokin and W. W. Tjawokin Jun. 1980 19 p refs Transl. into ENGLISH from Virchows Arch., A. (West Germany), v. 346, 1969 p 29-45 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3198)
(NASA-TM-76196) Avail: NTIS HC A02/MF A01 CSCL 06C

A new method for producing arteriosclerosis with coronary insufficiency in rabbits by means of immobilization is described and discussed. The experimentally induced atherosclerosis develops due to hypodynamics imposed by the reduced muscular activity without overloading with exogenous cholesterol. The atherosclerosis and coronary insufficiency are associated. With variations in the duration and extent of immobilization, coronary insufficiency alone or with atherosclerosis can be produced.
R.E.S.

N80-27991*# National Aeronautics and Space Administration, Washington, D. C.
EFFECT OF PSYCHOTROPIC DRUGS ON GASTRIC ULCERS INDUCED BY IMMOBILIZATION: INCREASED PROTECTIVE EFFECT OF AMITRIPTYLINE CAUSED BY CHLORDIAZEPOXIDE
J. E. Blum and A. Huerlimann Jun. 1980 6 p refs Transl. into ENGLISH from Med. Pharmacol. Exp. (Switzerland), v. 15, no. 6, 1966 p 615-617 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by F. Hoffmann-La Roche and Co., Basel, Switzerland
(Contract NASw-3199)
(NASA-TM-76197) Avail: NTIS HC A02/MF A01 CSCL 06C

Amitriptyline, but not chlordiazepoxide, protects rats from the occurrence of gastric erosions and ulcers following immobilization. When, however, chlordiazepoxide is given together with amitriptyline the protective effect of the latter is markedly increased.
Author

N80-27992*# National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF HYPODYNAMIA ON THE HEMOCOAGULATIVE PROPERTIES OF THE VASCULAR WALL AND MYOCARDIUM
V. I. Inchina Jun. 1980 9 p refs Transl. into ENGLISH from Kardiologiya (USSR),v. 18, no. 3, Mar 1978, p 126-129 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(NASA-TM-76199) Avail: NTIS HC A02/MF A01 CSCL 06C

The hemocoagulative properties of the aorta (laminar), myocardium, hollow veins, and fibrinolytic capacity of tissues were studied in 14 rabbits subjected to 7 days of restricted mobility and compared to those of 10 control animals. Two tables of results show that, as a result of hypodynamia, the thromboplastic activity of the inner and middle layers of the aorta together with the destruction of endothelium increases the hemocoagulative potential and creates the threat of thrombogenesis. There is also an increase in fibrin-stabilizing activity for all tissues.
Author

N80-27993*# National Aeronautics and Space Administration, Washington, D. C.
EFFECTS OF IMMOBILIZATION ON SPERMIOGENESIS
E. R. Meitner 30 Jul. 1980 14 p refs Transl. into ENGLISH from Acta Anat. (Switzerland), no. 95, 1976 p 300-308 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by Comenius Univ. of Bratislava, Czecholovakia
(Contract NASw-3199)
(NASA-TM-76282) Avail: NTIS HC A02/MF A01 CSCL 06C

The influence of immobilization stress on spermiogenesis in rats was investigated. After 96 hour immobilization, histological changes began to manifest themselves in the form of practically complete disappearance of cell population of the wall of seminiferous tubule as well as a markedly increased number of cells with pathologic mitoses. Enzymological investigations showed various changes of activity (of acid and alkaline phosphatase and nonspecific esterase) in the 24, 48, and 96 hour immobilization groups.
R.E.S.

N80-27994# Joint Publications Research Service, Arlington, Va.
USSR REPORT: SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 14, NO. 3, 1980
27 Jun. 1980 158 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 158 p
(JPRS-75956) Avail: NTIS HC A08/MF A01

The effects of prolonged exposure to space flight factors are examined. Hemodynamic responses, physiological effects, biological effects as well as the effects of reduced motor activity and weightlessness are considered. Results of ground-based and spaceborne experiments on various laboratory animals are included.

N80-27995# Joint Publications Research Service, Arlington, Va.
BIOCHEMICAL BASES OF PATHOGENESIS OF HYPOKINESIA
I. V. Fedorov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 1-12 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 3-10

Avail: NTIS HC A08/MF A01

An attempt to gain an insight into pathogenetic mechanisms and sequence of reactions responsible for changes in the metabolism of proteins, carbohydrates, and fats of hypokinetic animals is described.
J.M.S.

N80-27996# Joint Publications Research Service, Arlington, Va.
RESULTS OF STUDIES OF PULSED BLOOD FLOW AND REGIONAL VASCULAR TONUS DURING FLIGHTS IN THE FIRST AND SECOND EXPEDITIONS ABOARD THE SALYUT-6 - SOYUZ ORBITAL COMPLEX
V. F. Turchaninova and M. V. Domracheva *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 13-18 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 11-14

Avail: NTIS HC A08/MF A01

The dynamics of pulse blood filling and regional vascular tone was studied in the crewmembers of 96 and 140 day flights aboard the station Salyut-6 - Soyuz. Measurements were taken before, during and after flights, using a specially designed tetrapolar rheography. Rheograms of the torso, forearms, legs, and rheoencephalograms of the right and left hemispheres in the frontal-mastoidal lead were recorded. The results show that in zero-g the cosmonauts developed typical hemodynamic changes indicative of cephalad blood shifts.
Author

N80-27997# Joint Publications Research Service, Arlington, Va.
CIRCULATION IN EXERCISING CREW MEMBERS OF THE FIRST MAIN EXPEDITION ABOARD SALYUT-6
V. S. Georgiyevskiy, N. A. Lapshina, L. Ya. Andriyako, L. C. Umnova, V. G. Doroshev, I. V. Alferova, V. N. Ragozin, and Ye. A. Kobzev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 19-23 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 15-18

Avail: NTIS HC A08/MF A01

During the 96 day flight aboard the Salyut-6 station the crewmembers showed a satisfactory response to bicycle ergometry of moderate load. However, cardiovascular regulation during

exercise declined, particularly by the end of the first and the begining of the second month. This was mainly associated with deconditioning due to an inadequate work load. Its increase helped to restore an initial level of circulation during exercise by the end of the mission. Author

N80-27998# Joint Publications Research Service, Arlington, Va.

HEMODYNAMICS AND PHASE STRUCTURE OF THE CARDIAC CYCLE IN MEMBERS OF THE FIRST CREW OF SALYUT-5 AT REST

V. A. Degtyarev, V. G. Doroshev, N. A. Lapshina, V. N. Ragozin, Z. A. Kirillova, S. I. Ponamarev, and O. B. Kulikov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 24-28 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 18-21

Avail: NTIS HC A08/MF A01

In the Salyut-5 flight studies of circulatory functions were continued. Heart rate, arterial pressure, time intervals of the left and right ventricles were measured at rest. Peripheral resistance and cardiac output were calculated. At early flight stages cardiovascular changes occurred due to an increased blood inflow to the heart. During the second half of the mission cardiac output and arterial pressure remained elevated, as fatigue of the cosmonauts increased. Author

N80-27999# Joint Publications Research Service, Arlington, Va.

EFFECT OF WEIGHTLESSNESS AND ARTIFICIAL GRAVITY ON ION-REGULATING FUNCTION OF RAT KIDNEYS

Ye. A. Ilin, Yu. V. Natochin, N. A. Ilyushko, Yu. I. Kondratyev, V. T. Bakhteyeva, Ye. M. Gazhala, O. A. Gomcharevskaya, Ye. A. Lavroua, and Ye. I. Shakhmatova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 29-34 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 21-25

Avail: NTIS HC A08/MF A01

Weightless rats showed greater changes in the fluid-electrolyte metabolism and ion regulatory function of the kidneys than centrifuged rats. During water loads they exhibited an increased sodium excretion. During potassium loads they displayed a higher potassium excretion. The study of electrolyte composition of different kidney segments demonstrated a reduced potassium content in the wet cortical and medullary matter due to elevated tissue hydration. Kidney microdissection did not reveal any structural differences in nephrons of the weightless and centrifuged rats. Author

N80-28000# Joint Publications Research Service, Arlington, Va.

ACTIVITY OF SOME HEPATIC ENZYMES AND LIPOGENETIC PROCESSES IN RAT AIPOSE TISSUE AFTER SPACE FLIGHT

L. Makho, Sh. Nemet, M. Palkovich, V. Shtrbak, and R. A. Tigranyan *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 35-40 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 26-29

Avail: NTIS HC A08/MF A01

The rats flown aboard Cosmos-782 showed a significant increase in the activity of tyrosine aminotransferase and tryptophan pyrolase, i.e., the enzymes whose activity depends on the corticosterone level. The synchronous rats displayed a small increase in the enzyme activity. The flight and synchronous animals exhibited a slight increase in the activity of gluconeogenetic enzymes and a decrease in the activity of glucose-6-phosphatase. Immediately after flight and, to a lesser extent, after the synchronous experiment the activity of lipogenetic enzymes decreased. On the R+25 day the enzyme activity remained unchanged. The study of lipogenesis in the epididymal fat, using C14-glucose incorporation into lipids, did not reveal any differences in the flight and synchronous rats. The findings demonstrated that changes in the enzyme activity induced by the flight and synchronous experiments returned to the normal during readaptation. Author

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N80-28001# Joint Publications Research Service, Arlington, Va.

STATE OF RAT THYROID C CELLS FOLLOWING FLIGHTS ON THE COSMOS TYPE OF BIOSATELLITES (ACCORDING TO RESULTS OF A MORPHOLOGICAL STUDY)

G. I. Plakhuta-Plakutina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 41-46 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 29-33

Avail: NTIS HC A08/MF A01

Calcitonin-secreting cells (C-cells) of the thyroid glands from 51 SPF Wistar rats flown for 18.5 to 22 days aboard biosatellites Cosmos-605, 782 and 936 and sacrificed 4.5-13 hours, 1-2 and 25-27 days after recovery were examined histologically and karyometrically. Vivarium (57) and synchronous (58) rats were used as controls. Variations in the nuclear volume of C-cells and their density were shown to depend on the experimental conditions and time interval elapsed after recovery. Morphological changes in C-cells were assumed to be associated with alterations in calcium metabolism during an exposure of rats to weightlessness, artificial gravity, and Earth gravity. Author

N80-28002# Joint Publications Research Service, Arlington, Va.

SOME ASPECTS OF APPLICATION OF THE SYSTEMIC APPROACH TO AVIATION ENGINEERING PSYCHOLOGY

V. A. Ponomarenko and N. D. Zavalova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 47-52 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 33-37

Avail: NTIS HC A08/MF A01

The role of study and analysis of systemic properties of the equipment of cockpits for its optimization is examined. Pilot's errors caused by disadvantages of the total systemic quality of various components of the equipment are described. Methods for eliminating causes of some erroneous actions of pilots are discussed. J.M.S.

N80-28003# Joint Publications Research Service, Arlington, Va.

EFFECT OF PROLONGED +Gz ACCELERATIONS ON HUMAN PERFORMANCE

A. S. Barer, T. A. Sokolova, V. M. Tardov, and Yu. P. Yashin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 53-59 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 37-40

Avail: NTIS HC A08/MF A01

With an increase in acceleration value, the accuracy of human performance decreases. This becomes very noticeable at $+Gz > 5$ g. In this situation work capacity can be raised by increasing an angle between the Gz vector and the long axis of the human body. Pilots need to be tested for acceleration clearance before they are allowed to fly at $+Gz >$ or $= 8$ g. Author

N80-28004# Joint Publications Research Service, Arlington, Va.

HUMAN COLOR DISCRIMINATING FUNCTION WITH MUSCULAR TENSION DURING EXPOSURE TO VESTIBULAR STIMULI

Zh. M. Kudryashova and A. A. Shipov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 60-64 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 41-44

Avail: NTIS HC A08/MF A01

Human studies have demonstrated that arbitrary tension of muscle (back and legs) during repeated vestibular exposures not only delays the development of motion sickness but also contributes to the maintenance of color discriminative stability of the visual function. Author

N80-28005# Joint Publications Research Service, Arlington, Va.

EFFECT OF TRANSVERSE ACCELERATIONS ON INNERVATION OF THE GUINEA PIG'S CRURAL SKELETAL MUSCLES

V. Ya. Osaulenko *In its* USSR Rept.: Sapce Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 65-71 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 44-48

Avail: NTIS HC A08/MF A01

Guinea pigs were exposed to chest-to-back acceleration of 8 G for an hour. This exposure brought about significant morphological changes of a primary-reactive pattern in nerve elements of skeletal leg muscles. With time they enhanced: 6 hours and then 3 days after the experiment a small portion (1-1.5%) of nerve fibers underwent fragmentation and degradation. Motor nerve endings showed the highest resistance. The first signs of restitution of changes in the peripheral nervous system were seen 6 days after the exposure. Nerve fibers did not return to the normal 9 days after the beginning of the experiment. Author

N80-28006# Joint Publications Research Service, Arlington, Va.

STUDIES OF PROGNOSTIC SIGNIFICANCE OF ANTIORTHOSTATIC POSITION

Kh. Kh. Yarullin, V. A. Gornago, T. D. Vasilyeva, and M. Ye. Gugushvili *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 72-80 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 48-54

Avail: NTIS HC A08/MF A01

The prognostic significance of head-down tilt at -15 deg and -30 deg for 6 min at each step was assessed in 40 normal men, aged 22 to 39. The study of mean values of the maximal amplitude, relative duration of the anacrotic phase, dicrotic, and diastolic indices of hemispheric and bimastoidal rheoencephalography as well as of health condition helped to determine cerebral circulation in test subjects with good and moderate tolerance to head-down tilt and to define the criteria of tilt tolerance. The test subjects who showed good tolerance to head-down tilt displayed a simultaneous compensatory increase of the tone of large caliber arteries and arterioles that was accompanied by a noticeable increase in cerebral pulse blood filling at -15 deg and a moderate increase at -30 deg as well as the feeling of a slight blood rush to the head. The test subjects who displayed moderate tolerance to heat-down tilt showed only an increase in the tone of large caliber vessels; they also exhibited a marked decrease in the tone of arterioles, venules, and veins (especially at -30 deg) which was combined with a significant increase in the cerebral pulse blood filing and an appearance of marked venous waves on rheoencephalograms. Author

N80-28007# Joint Publications Research Service, Arlington, Va.

EVALUATION OF EFFICACY OF THE SET OF PREVENTIVE MEASURES REFERABLE TO THE HUMAN NEUROMUSCULAR SYSTEM UNDER HYPOKINETIC CONDITIONS

V. A. Tishler, V. 1. Safonov, and Z. A. Krivitsina *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 81-85 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), no. 3, 1980 p 54-57

Avail: NTIS HC A08/MF A01

Excitability and lability of the musculus rectus femoris was studied to evaluate efficiency of exercises during bed rest. A combination of exercises with other countermeasures did not reduce their prophylactic effect. A.M.S.

N80-28008# Joint Publications Research Service, Arlington, Va.

THE STRESS REACTION TO HYPOKINESIA AND ITS EFFECT ON GENERAL RESISTANCE

I. P. Chernov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 86-90 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 57-60

Avail: NTIS HC A08/MF A01

Rat experiments demonstrated that the development of the hypokinetic syndrome involves occurrence of a three stage, stress reaction characterized by a change in the general health state, body mass, and activity of the hypothalamic-pituitary-adrenal system. The hypokinetic stress affects total resistance and ionizing radiation sensitivity of animals. At a certain stage of development the hypokinetic stress contributes to the state of elevated cross resistance. J.M.S.

N80-28009# Joint Publications Research Service, Arlington, Va.

REGIONAL REDISTRIBUTION OF RAT BLOOD AFTER 7 AND 30 DAYS OF HYPOKINESIA

O. A. Kovalev, V. F. Lysak, V. I. Severovostokova, and S. K. Sheremetevskaya *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 91-96 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 60-64

Avail: NTIS HC A08/MF A01

An exposure of rats to hypokinesia was accompanied by a significant increase in the total amount of circulating blood per unit body mass. The percentage blood content was increased in the myocardium, lungs, liver, kidneys, small intestine, muscles and bones of the chest. The percentage blood content was decreased in the skin of different body segments, muscles and bones (except of the chest), tail, viscera (large intestine, adrenals, spleen, bladder, testes). The major regional redistribution of blood was its displacement into the liver. Author

N80-28010# Joint Publications Research Service, Arlington, Va.

SECRETION, INCRETION AND RESECRETION OF PANCREATIC LIPASE DURING PROLONGED RESTRICTION OF MOTOR ACTIVITY

I. L. Medkova, N. M. Nikolayeva, and K. V. Smirnov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 97-103 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 64-67

Avail: NTIS HC A08/MF A01

The effect of 20, 60, 90 and 120 day hypokinesia on secretion, incretion, and recretion of pancreatic lipase of rats was examined. It was found that 60, 90 and 120 day hypokinesia induced significant and similar changes - lipase decrease in the pancreas and increase in blood, bile, salivary glands and stomach mucosa; 20 day hypokinesia did not produce any effect on the above parameters. Author

N80-28011# Joint Publications Research Service, Arlington, Va.

THEORETICAL ANALYSIS OF THE EFFECT OF STATE OF PULMONARY CIRCULATION ON DISTRIBUTION OF VENTILATION-PERFUSION RELATIONS AND GAS EXCHANGE IN THE LUNGS

A. I. Dyachenko and V. G. Shabelnikov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 104-109 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 68-71

Avail: NTIS HC A08/MF A01

Using a mathematical model of functionally nonuniform lungs, the effect of gravational inequality of ventilation perfusion relations on gas exchange was studied. The dependence of tensions of

respiratory gases in the mixed arterial blood and alveolar air upon pulmonary circulation pressure was demonstrated. The influence of changes in the tone of lung vessels on the distribution of ventilation perfusion relations and gas exchange was investigated. Author

N80-28012# Joint Publications Research Service, Arlington, Va.

METHOD FOR ASSESSING HEMODYNAMICS AND DETECTING LATENT INSUFFICIENCY OF CEREBRAL CIRCULATION IN COSMONAUT CANDIDATES

D. A. Alekseyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 110-116 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 71-74

Avail: NTIS HC A08/MF A01

Experience in screening cosmonaut candidates shows that many of them present osteochondrosis of the cervical spine. In some of the selected individuals, the signs of intervertebral osteochondrosis are progressing. Osteophytes in this region sometimes cause ischemic circulatory disturbances in the vertebrobasilar system as a result of reflex angiospasm of vertebral arteries and mechanical compression of the latter. For this reason, it is very important to assess blood flow in the systems of the vertebral arteries (basilar and internal carotid) and determine the functional capabilities of collaterals and latent circulatory disturbances in the corresponding vascular reservoirs. A functional test used for this purpose, involving rotation of the head and throwing it back to an angle of 45 deg is described. J.M.S.

N80-28013# Joint Publications Research Service, Arlington, Va.

ULTRASONIC METHOD OF RECORDING GAS BUBBLES IN ANIMAL VENOUS BLOOD IN A RAREFIED ATMOSPHERE

R. T. Kazakova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 117-121 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 74-76

Avail: NTIS HC A08/MF A01

A method of recording [demonstrating] intravascular gas bubbles, which appear under the influence of decompression due to elevated pressure, with the use of ultrasonic equipment is described. The possibility of using the ultrasonic method to study the process of gas production in animals and man in a rarefied atmosphere is demonstrated. This method can be used in the system for monitoring the physiological condition of man at high altitudes. J.M.S.

N80-28014# Joint Publications Research Service, Arlington, Va.

ISOLATION AND GAS CHROMATOGRAPHIC DEMONSTRATION OF VOLATILE ORGANIC SUBSTANCES IN THIN-LAYER BIOLOGICAL SAMPLES

N. F. Sopikov and A. I. Gorshunova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 3, 1980 (JPRS-75956) 27 Jun. 1980 p 122-127 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (Moscow), v. 14, no. 3, 1980 p 77-79

Avail: NTIS HC A08/MF A01

Gas chromatographic methods are used to demonstrate organic compounds in studies of the effects of space flight factors and conditions (for example, hypokinesia, radiation, hypoxia, etc.) on processes of accumulation, distribution and elimination of volatile chemicals from the human and animal organism. A simple and rapid method was developed for isolating volatile organic substances from biological media and tissues to be submitted to gas chromatographic analysis. This method was based on the principle of direct thermal evaporation of volatile compounds from thin layer biological samples, obtained by using a pyrolytic attachment with the chromatograph. J.M.S.

N80-28015# Joint Publications Research Service, Arlington, Va.

USSR REPORT. SPACE BIOLOGY AND AEROSPACE MEDICINE, VOLUME 14, NO. 2, 1980

O. G. Gazenko, ed. 8 May 1980 157 p refs Transl. into ENGLISH of Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 157 p

(JPRS-75654) Avail: NTIS HC A08/MF A01

The biological and physiological effects of long term space flight are examined. Hyperbaric conditions, hypokinesia, weightlessness, hypoxia, and hypercapnia are among the support systems are included.

N80-28016# Joint Publications Research Service, Arlington, Va.

RESPIRATION AND GAS EXCHANGE UNDER HYPERBARIC CONDITIONS

L. A. Bryantseva, I. S. Breslav, and A. G. Dianov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 1-14 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 3-10

Avail: NTIS HC A08/MF A01

The effects of hyperbaric environments on respiratory function are discussed. Respiratory mechanics, pulmonary ventilation, and oxygen and carbon dioxide transport are included. Particular attention is given to the respiratory system as a limiting factor for human performance in a hyperbaric environment. Optimization of gas mixtures used in undersea dives is discussed. J.M.S.

N80-28017# Joint Publications Research Service, Arlington, Va.

CIRCULATION AT REST IN CREW MEMBERS OF THE FIRST MAIN EXPEDITION ABOARD SALYUT 6

V. A. Degtyarev, V. G. Doroshev, V. M. Mikhaylov, V. S. Georgiyevskiy, S. A. Kobzev, Z. A. Kirillova, N. A. Lapshina, V. G. Savelyeva, and L. V. Umnova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 15-19 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 11-14

Avail: NTIS HC A08/MF A01

Results of in-depth medical examinations of crew members who participated in the first expedition involving a 96 day space flight aboard the Salyut-6 orbital station are presented. Distinct variations of certain cardiovascular parameters exhibited an early stage, later returned to the normal. These changes are characteristics of individual processes of human adapatation to weightlessness. J.M.S.

N80-28018# Joint Publications Research Service, Arlington, Va.

STATE OF HUMAN BONE TISSUE PROTEIN FRACTION AFTER SPACE FLIGHTS

A. A. Prokhonchukov, V. K. Leontyev, N. A. Zhizhina, R. A. Tigranyan, A. G. Kolesnik, and N. A. Komissarova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JRPS-75654) 8 May 1980 p 20-26 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 14-18

Avail: NTIS HC A08/MF A01

Amino acid composition and bone mineralization were studied qualitatively and qualititatively on autopsy of the three crewmembers after their 28 day space flight aboard the orbital station Salyut 1. Sixteen amino acids were detected in the bone protein fraction: cystine and cysteine, lysine histidine, arginine, aspartic acid, serine, glycine, glutamic acid, threonine, alanine, proline, valine, phenylalanine, leucine and isolcusine, oxyproline. No abnormalities in the amino acid composition or the bone organic content were found in the postflight analysis. The role of protein matrices of calcified tissues in mechanisms of bone resistance and adaptation to space flight effects is discussed. J.M.S.

N80-28019# Joint Publications Research Service, Arlington, Va.

RESEARCH HARDWARE AND HABITAT OF ANIMALS USED IN EXPERIMENT ABOARD COSMOS-936 BIOSATELLITE

B. A. Adamovich, Ye. A. Ilin, A. D. Noskin, V. I. Milyavskiy, G. N. Pliskovskaya, V. K. Golov, V. S. Poleshchuk, V. K. Ovcharov, and A. A. Shipov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 27-32 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 18-22

Avail: NTIS HC A08/MF A01

The hardware used to provide the support to experimental animals (rats) and to obtain information in-flight is described. The hardware includes two specially designed centrifuges to generate artificial gravity. The environmental parameters in the mock-up cabin and field laboratories used at the recovery site are also described. J.M.S.

N80-28020# Joint Publications Research Service, Arlington, Va.

PRINCIPAL RESULTS OF PHYSIOLOGICAL EXPERIMENTS WITH MAMMALS ABOARD THE COSMOS-936 BIOSATELLITE

O. G. Gazenko, Ye. A. Ilin, A. M. Genin, A. R. Kotovskaya, V. I. Korolkov, R. A. Tigranyan, and V. V. Portugalov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 33-37 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 22-25

Avail: NTIS HC A08/MF A01

The program of the 18.5 day flight of the biosatellite Cosmos-936 included studies of physiological effects of prolonged weightlessness (20 rats) and artificial gravity (10 rats). The latter produced a normalizing effect on the function of the myocardium, musculo-skeletal system, and excretory system. Simultaneously, artificial gravity exerted an adverse effect on the functions dependent on several sensors, primarily optic, vestibular, and motor sensors. It is postulated that the adverse effects are associated with a relatively high rate of rotation and a short arm of the centrifuge. Author

N80-28021# Joint Publications Research Service, Arlington, Va.

SEMICIRCULAR CANAL FUNCTION IN RATS AFTER FLIGHT ABOARD THE COSMOS-936 BIOSATELLITE

A. A. Shipov and V. G. Ovechkin *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 38-44 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 25-30

Avail: NTIS HC A08/MF A01

The nystagmic reflex, latent period, total and mean number of events, and their duration were measured in the rats flown for 18.5 days aboard the biosatellite Cosmos-936 under the conditions of weightlessness and artificial gravity. It is demonstrated that prolonged weightlessness did not influence the receptor formations and centers of semicircular canals. A long exposure to artificial gravity brought about a decrease in reactivity and sensitivity of semicircular canals. The mechanisms of these phenomena are discussed. J.M.S.

N80-28022# Joint Publications Research Service, Arlington, Va.

ROLE OF DYNAMIC SPACE FLIGHT FACTORS IN THE PATHOGENESIS OF INVOLUTION OF LYMPHATIC ORGANS (EXPERIMENTAL MORPHOLOGICAL STUDY)

A. S. Kaplanskiy and G. N. Durnova *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 45-52 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 30-35

Avail: NTIS HC A02/MF A01

The role of the dynamic factors in accidental involution of lymph organs was investigated in a ground based study simulating a 20 day space flight. It is inferred from the study that lymph organ involution observed in rats exposed to prolonged space flights is caused by chronic and acute stresses. Chronic stress is associated with weightlessness and leads to hypoplasia of lymphs organs; acute stress is connected with the transition from weightlessness to normal gravity (gravity stress), thus enhancing chronic stress induced lymph tissue hypoplasia. Spleens of both weightless and hypokinetic rats slow inhibition of crythropoiesis and accumulation of hemosiderine due to accelerated erythrocyte degradation caused by diminished motor activity. J.M.S.

N80-28023# Joint Publications Research Service, Arlington, Va.

EFFECT OF HIGH AMBIENT TEMPERATURE ON HUMAN PERFORMANCE

A. N. Azhayev, V. I. Zorile, and A. N. Koltsov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 53-57 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 20 Mar./Apr. 1980 p 35-38

Avail: NTIS HC A08/MF A01

Mental and physical capacity of men exposed to 30 to 35 deg at low humidity and to 25 to 30 deg at high humidity remained unaltered. The capacity of men exposed to 40 to 55 C at 10 to 25% of relative humidity and to 35 to 40 C at 85% of relative humidity declined. Author

N80-28024# Joint Publications Research Service, Arlington, Va.

DYNAMICS OF HUMAN EXTERNAL RESPIRATION AND BLOOD GASES UNDER THE COMBINED EFFECT OF HYPERCAPNIA AND HYPOXIA

L. Kh. Bragin, A. Ye. Severin, N. A. Agadzhanyan, G. A. Davydov, and Yu. A. Spasskiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 58-62 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 38-41

Avail: NTIS HC A08/MF A01

In manned experiments gas mixtures with a step-by-step increasing (p)CO2 and hypoxia of different levels were used. The experiments demonstrated variations in respiration, buffer systems, and gases of the blood. The studies emphasized an important physiological role of a constant (p)CO2 in blood, when breathing gas mixtures with a different O2 content. Author

N80-28025# Joint Publications Research Service, Arlington, Va.

FUNCTIONAL STATE OF THE CARDIOVASCULAR SYSTEM UNDER THE COMBINED EFFECT OF 28 DAY IMMERSION, ROTATION ON A SHORT-ARM CENTRIFUGE AND EXERCISE ON A BICYCLE ERGOMETER

I. F. Vil-Vilyams and Ye. B. Shulzhenko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 63-68 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 42-45

Avail: NTIS HC A08/MF A01

The cardiovascular function of four test subjects exposed to 28 day dry immersion was examined before and after 6 day cycles of rotation in a short-arm centrifuge to provide 1 to 2 Gz, bicycle ergometer exercise, and their combination. An exposure to acceleration of 3 Gz in a 7.25 m arm centrifuge was used as a provocative test. The above countermeasures reduced but not climinated entirely immersion-induced cardiovascular deconditioning. A combined use of acceleration of 1 to 2 Gz in a short-arm centrifuge and bicycle ergometer exercise can be recommended as a countermeasure against cardiovascular deconditioning in weightlessness. J.M.S.

N80-28026# Joint Publications Research Service, Arlington, Va.

PHARMACOLOGICAL ANALYSIS OF PHYSIOLOGICAL MECHANISMS OF ORTHOSTATIC HEMODYNAMIC STABILITY

L. I. Osadchiy *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 69-74 refs Tansl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 45-49

Avail: NTIS HC A08/MF A01

In urethane anesthesized cats, securinine brought about a distinct increase in compensatory reactions of arterial pressure and cardiac output during an upright tilt at 45 deg. The experiments also showed a substantial increase in compensatory recovery of the volume velocity of circulation in the posterior vena cava. Myorelaxant induced arrest of contractile function of skeletal muscles prior to securinine administration reversed compensatory reactions of arterial pressure and cardiac output during tilt test. Author

N80-28027# Joint Publications Research Service, Arlington, Va.

BIOELECTRIC ACTIVITY OF THE HUMAN BRAIN DURING AND AFTER 182-DAY ANITORTHOSATIC HYPOKINESIA

T. N. Krupina, Kh. Kh. Yarullin, and D. A. Alekseyev *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 75-83 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 49-54

Avail: NTIS HC A08/MF A01

Cerebral bioelectric activity of 18 healthy test subjects, aged 31 to 40, was examined during and after their 182 day head-down tilting. The test subjects were divided into a group that performed countermeasures (exercise, muscle stimulation) against hypokinesia-induced disorders and a control group. During the study EEG changes were most pronounced in the controls: alpha-rhythm amplitude, frequency, and index decreased; slow wave frequency reduced; index of zonal differences and amplitude beta and slow waves increased. Phasic changes in the central nervous system excitability in response to a flickering light of 6 to 25 cps were found. Typical changes in spontaneous EEG during a 3 min pulmonary hyperventilation test were enhanced. The study gives evidence that the dynamics of spontaneous EEG as well as cerebral bioelectric activity in response to flickering light and pulmonary hyperventilation are important indicators of the cerebral function, especially of the cortical activity decrease. Author

N80-28028# Joint Publications Research Service, Arlington, Va.

MORPHOMETRIC ANALYSIS OF GLOMERULES AND JUXTAGLOMERULA SYSTEM OF THE RAT KIDNEY IN THE COURSE OF EXPERIMENTAL HYPOKINESIA

I. P. Chernov and A. G. Gaffarov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 84-89 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2 Mar./Apr. 1980 p 54-47

Avail: NTIS HC A08/MF A01

A certain correlation between variations in the means of the volume of cortical and juxtamedullary glomerules and the function of the juxtaglomerular apparatus was established. It is hypothesized that at early hypokinesia renal vascular changes are nonspecific. The phenomenon of renal excretion of fluids and electrolytes is explained in terms of a simultaneous increase in the reninangiotensin activity and 11-hydroxycorticosteroid content in plasma. J.M.S.

N80-28029# Joint Publications Research Service, Arlington, Va.

EFFECT OF HYPOKINESIA ON CHANGES IN CARBOHYDRATE AND LIPID METABOLISM IN THE HEART AND LIVER

Yu. P. Rylnikov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 90-96 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2 Mar./Apr. 1980 p 57-62

Avail: NTIS HC A08/MF A01

The rate of assimilation of carbohydrates via glycolysis and the pentose-phosphate pathway, as well as changes in B bile in hypokinetic rabbits were studied. Results indicate that rigid immobilization of rabbits is accompanied by a reduction of glycolysis rate in the liver and, particularly, in the heart, and a simultaneous increase of the fraction of carbohydrate utilization in the pentose phosphate pathway. It is also followed by cholesterol accumulation in the blood and tissues in spite of an accelerated bile excretion of cholesterol and its derivatives, biles acids. J.M.S.

N80-28030# Joint Publications Research Service, Arlington, Va.

EFFECT OF CONDITIONING FOR HYPOXIA ON FERTILITY OF WHITE MICE

V. B. Malkin and Ye. A. Stroganora *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 97-102 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 62-66

Avail: NTIS HC A08/MF A01

A prolonged effect of hypoxia on the reproductive function and development of pups of white mice was investigated. Beginning with the age of 2 months the animals were exposed to an altitude of 5500 m for 6 hours a day during 9 months: The mice that were so adapted to and mated in hypoxia did not deliver any offspring. The animals that were adapted to hypoxia during intrauterine and postnatal development and mated at 5500 m delivered normal although much smaller litters. J.M.S.

N80-28031# Joint Publications Research Service, Arlington, Va.

THE QUESTION OF USING DEHYDRATED FOODS DURING LONG-TERM SPACE FLIGHTS

V. P. Bychkov and M. V. Markaryan *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 103-109 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 66-70

Avail: NTIS HC A08/MF A01

The results of five studies on 35 test subjects conducted to test diets of dehydrated products to be used in prolonged space flights are discussed. It is demonstrated that a diet consisting of only dehydrated food products can be used for a prolonged time (up to 1 year). Dehydrated foods after a 2 year storage and proton irradiation at a dose of 24,000 rad retain their biological value and assure and adequate nutritional status. On this basis a space diet composed of dehydrated foods developed. J.M.S.

N80-28033# Joint Publications Research Service, Arlington, Va.

STUDY OF COMPATILIBITY OF CERTAIN HIGHER PLANTS AND CHLORELLA AS RELATED TO A BIOREGENERATIVE HUMAN LIFE SUPPORT SYSTEM

Yu. I. Shaydorov, B. N. Shebalin, and G. I. Meleshko *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 116-122 refs Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 74-78

Avail: NTIS HC A08/MF A01

Mutual effects of Chlorella and higher plants cultivated together in a closed atmosphere are discussed. It can be inferred that gaseous products of Chlorella did not exert a significant effect on the carbon dioxide consumption by wheat and radish plants or on their biomass increment. In turn, gaseous products of higher plants did not or influence Chlorella growth. It can, therefore, be concluded that Chlorella and the above higher plants, when cultivated in a common atmosphere, do not inhibit each other and can be regarded as biologically compatible constituents of the photoautotrophic component of future bioregenerative life support systems. J.M.S.

N80-28034# Joint Publications Research Service, Arlington, Va.

GENERALIZED NYSTAGMOMETRIC CHARACTERISTICS FOR DIAGNOSTIC PURPOSES

M. M. Leuashov and A. I. Tumakov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 123-129 refs Transl. into ENGLISH from

Kosm. Biol. Aviakosm. Med. (USSR), v. 14, no. 2, Mar./Apr. 1980 p 78-82
Avail: NTIS HC A08/MF A01

The optokinetic reactions of children ranging in age from three to seven years who were not suffering from vestibular dysfunctions were recorded at three stimulus rates. The results of statistical processing for the parameters of right and left optokinetic reactions are reported. A distinct difference in behavior of two parameters of nystagmus, RSC and frequency, is noted. J.M.S.

N80-28035# Joint Publications Research Service, Arlington, Va.

UPGRADING EFFICACY OF MEMBRANE TECHNIQUES FOR REGENERATING WATER FROM URINE

B. A. Adamovich, V. D. Volgin, N. M. Nazarov, Yu. Ye. Sinyak, and S. V. Chizhov *In its* USSR Rept.: Space Biol. and Aerospace Med., Vol. 14, No. 2, 1980 (JPRS-75654) 8 May 1980 p 130-113 ref Transl. into ENGLISH from Kosm. Biol. Aviakosm. Med. (USSR), V. 14, no. 2 Mar./Apr. 1980 p 82-83

Avail: NTIS HC A08/MF A01

A method of regenerating water from urine involving evaporation through membranes and reverse osmosis is described. The effectiveness of the process was tested on a laboratory unit with an evaporator made of porous cermet. The productivity of the process was found to be stable over a long period of time. J.M.S.

N80-28037 Johns Hopkins Univ., Baltimore, Md.

NONLINEARITIES IN AUDITORY-NERVE FIBER RESPONSES TO BANDLIMITED NOISE: AN EXPERIMENTAL STUDY AND A MODEL Ph.D. Thesis

Thomas Barton Schalk 1980 222 p
Avail: Univ. Microfilms Order No. 8014270

Discharge rate was measured as a function of spectral level for noise bursts of one bandwidth and center frequency. Such rate level functions were measured for a number of bandwidths; either the low or high cutoff frequencies were set at fiber characteristic frequency (CF). Rate level functions were also measured, simultaneously, for single tones at CF. Dynamic range is defined as the range, in dB, over which rate increases from 10 percent to 80 percent of the maximum driven rate to CF tones. When pooling data across CF in single cats, dynamic range is an increasing function of fiber threshold for CF tones and noise stimuli. Narrow bands of noise produce rate-level functions that are similar to those for CF tones. For noise bands centered above CF, rate-level functions became less steep as bandwidth is increased, and are always monotonic. For wide bands of noise centered below CF, rate-level functions can be nonmonotonic or appear to plateau at rates less than the saturation rate to CF tones. Thus, wide bands of noise centered above or below CF can produce lower discharge rates than do narrowbands at the same spectral level. Dissert. Abstr.

N80-28038# Naval Medical Research Inst., Bethesda, Md.

MEASUREMENT OF LUNG FUNCTION USING MAGNETOMETERS. 1: PRINCIPLES AND MATHEMATICAL MODELING Progress Report

Donald L. Vawter Nov. 1979 54 p refs
(AD-A083910; MNRI-79-78; Rept-2) Avail: NTIS HC A04/MF A01 CSCL 06/16

The use of magnetometer systems to predict pulmonary air volumes was studied. The sensitivity of the system to angular rotations was found to be small because magnetometers are normally mounted to the subject. Seven mathematical models for predicing volume were investigated, with the finding that two parameter models are adequate for quiet breathing. For complicated maneuvers, a three-parameter model is necessary, and for predictive usefulness, the model must be calibrated using a complex maneuver. Results of studies of the dimensional changes, and the correlation between the dimensional changes, that occur during normal breathing are presented. Author

N80-28039*# National Aeronautics and Space Administration, Washington, D. C.

EFFECT OF HYPOKINESIA ON INVERTASE ACTIVITY OF THE MUCOSA OF THE SMALL INTESTINE

A. Abdusattarov Jun. 1980 5 p refs Transl. into ENGLISH from Uzb. Biol. Zh. (USSR), no. 1, 1978 p 61-62 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prepared by Academy of Sciences (USSR)
(NASA-TM-76191) Avail: NTIS HC A02/MF A01 CSCL 06P

The effect of prolonged hypokinesia on the enzyme activity of the middle portion of the small intestine was investigated. Eighty-four mongrel white male rats weighing 170-180 g were divided into two equal groups. The experimental group were maintained in single cages under 30 days of hypokinetic conditions and the control animals were maintained under ordinary laboratory conditions. It is concluded that rates of invertase formation and its inclusion in the composition if the cellular membrane, if judged by the enzyme activity studied in sections of the small intestine, are subject to phase changes in the course of prolonged hypokinesia. R.E.S.

N80-28040*# National Aeronautics and Space Administration, Washington, D. C.

MORPHOFUNCTIONAL CORRELATIONS IN THE EXPERIMENTAL STUDY OF MYOCARDIOPATHIES UNDER THE STRESS OF FORCED RESTRAINT. NOTE 2: THE INFLUENCE OF ADRENAL IMBALANCE

M. Dinu, S. Dolinescu, and A. Sneer May 1980 12 p refs Transl. into ENGLISH from Rev. Med.-Chir. (Iasi) (Romania), no. 1, 1978 p 87-91 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Orginal doc. prepared by Inst. of Med. and Pharmacy
(Contract NASw-3199)
(NASA-TM-76138) Avail: NTIS HC A02/MF A01 CSCL 06S

Tests were performed with 70 rats to determine the effects of restraint on the functions and structure of the myocardium under varying conditions of adrenal inbalance. Results showed that in rats with adrenal imbalance, fasting and restraint produced the same biochemical alterations as in the controls. The morphologic alteractions, as well as their electric expression, were more varied and evident in the animals with adrenal imbalance. Persistence of the microscopic and electrocardiographic alterations after 72 hours restraint in the animals subjected to unilateral adrenalectomy suggests chronic evolution of the myocardial lesions. This proves the necessity of intact adrenals for a good adaptability to stress. L.F.M.

N80-28041*# National Aeronautics and Space Administration, Washington, D. C.

CHANGES OF THE BODY FUNCTIONS DURING LONG-TERM HYPOKINESIA

Ye. A. Kovalenko, V. L. Popkov, Yu. I. Kondratev, E. S. Mailyan, Yu. S. Galushko, A. A. Prokhonchukov, V. A. Kazaryan, R. S. Morozova, L. V. Serova, A. N. Potapov et al May 1980 13 p refs Transl. into ENGLISH from Patol. Fiziol. Eksp. Ter. (USSR), no. 6, 1970 p 3-9 Transl. by Kanner (Leo) Associates, Redwood City, Calif.
(Contract NASw-3199)
(NASA-TM-76166) Avail: NTIS HC A02/MF A01 CSCL 06S

Prolonged hypokinesis (100-170 days) studied in 2000 rats kept in cages limiting their mobility provoked considerable changes in the gaseous and energetic metabolism: an elevation of the total gaseous metabolism and of the rate of O2 requirement by the muscles (in the late periods of hypokinesis) and a change in the intensity of tissue respiration of the liver and myocardium. There also proved to be a reduction in the level of phosphorylation and separation of oxidative phosphorylation in the myocardium, liver, and partially in the skeletal muscle. Prolonged hypokinesia led to changes in tissue metabolism: a disturbance of development of the animals, a marked delay and an increase in the weight of the organism and the muscular system, and disturbances of the mineral and protein metabolism. Prolonged hypokinesis also lead to exhaustion of the hypothalamus-hypophysis-adrenal cortex system. R.E.S.

N80-28042*# National Aeronautics and Space Administration, Washington, D. C.

THE RELATION BETWEEN TILT TABLE AND ACCELERATION-TOLERANCE AND THEIR DEPENDENCE ON STATURE AND PHYSICAL FITNESS

K. E. Klein, F. Backhausen, H. Bruner, J Eichhorn, D. Jovy, J. Schotte, L. Vogt, and H. M. Wegman Apr. 1980 30 p refs Transl. into ENGLISH from Intern. A. Angew. Physiol. (West Germany), v. 26, 1968 p 205-226 Original language document announced as A69-21304 Transl. by Kanner (Leo) Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-75796) Avail: NTIS HC A03/MF A01 CSCL 06S

A group of 12 highly trained athletes and a group of 12 untrained students were subjected to passive changes of position on a tilt table and positive accelerations in a centrifuge. During a 20 min tilt, including two additional respiratory maneuvers, the number of faints and average cardiovascular responses did not differ significantly between the groups. During linear increase of acceleration, the average blackout level was almost identical in both groups. Statistically significant coefficients of product-moment correlation for various relations were obtained. The coefficient of multiple determination computed for the dependence of acceleration tolerance on heart-eye distance and systolic blood pressure at rest allows the explanation of almost 50% of the variation of acceleration tolerance. The maximum oxygen uptake showed the expected significant correlation to the heart rate at rest, but not the acceleration tolerance, or to the cardiovascular responses to tilting. L.F.M.

N80-28043*# National Aeronautics and Space Administration, Washington, D. C.

VERTEBRAL PAIN IN HELICOPTER PILOTS

R. Auffret, R. P. Delahaye, P. J. Metges, and Vicens Jun. 1980 19 p *transl. into ENGLISH of "Les Algies Vertebrales des Pilotes d'Helicopteres"*, Rept. AGARD-CP-255, AGARD, Paris, Dec.1978 7 p Translation was announced as N79-19656 Transl. by Kanner (L Associates, Redwood City, Calif.

(Contract NASw-3199)

(NASA-TM-75792) Avail: NTIS HC A02/MF A01 CSCL 06P

Pathological forms of spinal pain engendered by piloting helicopters were clinically studied. Lumbalgia and pathology of the dorsal and cervical spine are discussed along with their clinical and radiological signs and origins. R.E.S.

N80-28044*# National Aeronautics and Space Administration, Washington, D. C.

THE CONTENT OF CATECHOLAMINES IN THE ADRENAL GLANDS AND SECTIONS OF THE BRAIN UNDER HYPOKINESIA AND INJECTION OF SOME NEUROTROPIC AGENTS

B. E. Melnik and E. S. Paladiy Mar. 1980 10 p refs Transl. into ENGLISH from Biol. Nauki (USSR), v. 15, no. 11, 1972 p 45-49 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by V. I. Lenin Kishinev State Univ. USSR

(Contract NASw-3199)

(NASA-TM-76010) Avail: NTIS HC A02/MF A01 CSCL 06S

The dynamics of catecholamine content were studied in the adrenal glands and in various region of the brain of white rats under hypokinesia and injections of neurotropic agents. Profound changes in body catecholamine balance occured as a result of prolonged acute restriction of motor activity. *Adrenalin retention* increased and noradrenanalin retention decreased in the adrenal glands, hypothalamus, cerebral hemispheres, cerebellum and medulla oblongata. Observed alterations in catecholamine retention varied depending upon the type of neurotropic substance utilized. Mellipramine increased catecholamine retention in the tissues under observation while spasmolytin brought about an increase in adrenalin concentration in the adrenals and a decrease in the brain. R.E.S.

N80-28045*# National Aeronautics and Space Administration, Washington, D. C.

MECHANISM OF SELECTIVE LESION OF THE CARDIOVASCULAR SYSTEM IN PSYCHO-EMOTIONAL STRESS

Yu. M. Repin and V. G. Startśev Apr. 1979 14 p refs Transl. into ENGLISH from Vestn. Akad. Nauk SSSR (USSR), v. 8, 1975 p 71-76 Translation was announced as N76-12713 Transl. by Kanner (Leo) Associates, Redwood City, Calif. Original doc. prep. by USSR Acad. of Med. Sci. Inst. for Pathology and Therapy

(Contract NASw-3199)

(NASA-TM-76035) Avail: NTIS HC A02/MF A01 CSCL 06S

A species predisposition to hypertensive and ischemic heart disease occurs in mammals only at the level of primates, and is associated with social regulation of biological reactions. The specific physiological mechanism giving rise to psychonerogenic pathology may be an inhibition of the motor component of the agressive-defensive response. Repeated combination of pursuit with subsequenct immobilization resulted in four out of five experimental baboons developing serious arterial hypertension and ischemic lesion of the heart which lasted many years.

Author

N80-28046*# National Aeronautics and Space Administration, Washington, D. C.

RESULTS OF THE INVESTIGATION OF THE OTOLITH FUNCTION IN MANNED SPACE FLIGHTS

L. N. Kornilova, G. D. Syrykh, I. K. Tarasov, and I. Ya. Yakovleva Jun. 1980 9 p refs Transl. into ENGLISH from Vestn. Otorino-Laringol. (USSR), no. 6, 1979 p 21-24 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by USSR Ministry of Health, Moscow

(Contract NASw-3198)

(NASA-TM-76103) Avail: NTIS HC A02/MF A01 CSCL 06P

The effects of conditions of long term and short term space flights on the otolith function of cosmonauts were investigated via pre and post examinations. The results show that after long term flight, the intensity of the otolith reflex increased and asymmetry occurred in the indicators of the otolith function. Large changes in terms of expression and duration in the indicators of the otolith function after long term flight as compared with short term flight were also noted. R.E.S.

N80-28047*# National Aeronautics and Space Administration, Washington, D. C.

CHARACTERISTICS OF ENZYMATIC INDUCTION PROVOKED BY CHLORDANE

A. Denys, E. Guilbert-Ber, and Jeanne Levy Jun. 1980 18 p refs Transl. into ENGLISH from Therapie (France), v. 30, 1975 p 277-288 Transl. by Scientific Translation Service, Santa Barbara, Calif. Original doc. prep. by Inst. of Pharmacology, Paris

(Contract NASw-3198)

(NASA-TM-76194) Avail: NTIS HC A02/MF A01 CSCL 06P

The effects of various stresses, such as restraint and lowering or raising of environmental temperature, in mice pretreated with chlordane were investigated. (Chlordane is an inhibitor of protein synthesis.) It was found that restraint or exposure to a cold environment for three hours mobilized the chlordane stored in the adipose tissue of mice. R.E.S.

N80-28048*# National Aeronautics and Space Administration, Washington, D. C.

CARDIOVASCULAR AND RESPIRATORY PHYSIOPATHOLOGICAL ASPECTS OF HYPOKINESIA

A. Dagianti Jun. 1980 26 p refs Transl. into ENGLISH from Recenti Progr. Med. (Italy), v. 52, no. 4, 1972 p 323-344 Transl. by Scientific Translation Service, Santa Barbara, Calif.

(Contract NASw-3198)

(NASA-TM-76198) Avail: NTIS HC A03/MF A01 CSCL 06S

The many effects of hypokinesia on the human organism are described. The differences in normally mobile subjects and hypokinetic subjects as relates to heart rate, average humeral pressure, cardiac capacity, cardia index, systolic range, and large cycle resistances are discussed. It is concluded that further studies

must be carried out in seven specific areas of cardiocirculatory damage due to hypokinesia. R.E.S.

N80-28049# Federal Aviation Administration, Washington, D. C. Office of Aviation Medicine.

EFFECTS OF OZONE ON EXERCISING AND SEDENTARY ADULT MEN AND WOMEN REPRESENTATIVE OF THE FLIGHT ATTENDANT POPULATION

E. A. Higgins, M. T. Lategola, J. M. McKenzie, C. E. Melton, and J. A. Vaughan Oct. 1979 106 p refs
(AD-A080045; FAA-AM-79-20) Avail: NTIS HC A06/MF A01 CSCL 06/16

Three studies at two ozone concentrations have been carried out in an attempt to define the effect level for ozone under simulated flight conditions. All experiments were carried out in an altitude chamber held at 6,000 feet MSL; relative humidity was kept at 10-12 percent and temperature at 68 - 74 F. Subjects paid were nonsmoking men and women in their third decade who had the anthropomorphic characteristics of airline flight attendants. All subjects were exposed to ozone in one experiment and to air only in another. Order of presentation of the experiments was balanced, and sessions were separated by 1 week. Study 1 consisted of exposure of 15 men and 12 women to 0.20 parts per million by volume (ppmv) ozone for 4 h with treadmill exercise for the last 10 min of each hour. In the second study 14 men and 14 women were exposed to 0.30 ppmv ozone for 3 h with 10 min exercise at the end of each hour. The third study consisted of exposure of 14 men and 14 women to 0.30 ppmv without exercise. Cardiopulmonary, performance, visual, and symptoms assessments were made. GRA

N80-28050# National Technical Information Service, Springfield, Va.

BIOLOGICAL EFFECTS OF MICROWAVES. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1978 - Apr. 1980

Elizabeth A. Harrison Apr. 1980 95 p Supersedes NTIS/PS-79/0433; NTIS/PS-78/0432
(PB80-808256; NTIS/PS-79/0433; NTIS/PS-78/0432) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 06R

The selected abstracts cover the biological effects on man and animals from exposure to microwaves. In addition to dosages and tolerances, regulations, and standards are included. This bibliography contains 88 abstracts, 43 of which are new entries to the previous edition. GRA

N80-28051# National Technical Information Service, Springfield, Va.

TOXICITY OF VINYL CHLORIDE. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1969 - Mar. 1980

Elizabeth A. Harrison Apr. 1980 102 p Supersedes NTIS/PS-79/0419; NTIS/PS-78/0442
(PB80-807662; NTIS/PS-79/0419; NTIS/PS-78/0442) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 06T

Research is cited on the health hazards from exposure to vinyl chloride and vinyl chloride resins. Studies are included on the epidemiology of industrial and public exposures to the compound and its degradation and combustion products. This updated bibliography contains 90 abstracts, 8 of which are new entries to the previous edition. GRA

N80-28052# National Technical Information Service, Springfield, Va.

ALTITUDE HYPOXIA. CITATIONS FROM THE NTIS DATA BASE Progress Report, 1978 - Mar. 1980

Elizabeth A. Harrison Apr. 1980 47 p
(PB80-807696; NTIS/PS-79/0428; NTIS/PS-78/0443) Copyright. Avail: NTIS HC $30.00/MF $30.00 CSCL 06S

The selected abstracts of research reports cover stress physiology, narcosis, acceleration tolerance, adaptation (physiology), psychophysiology, respiration, metabolism, and cardiovascular system as applied to altitude hypoxia. This updated bibliography contains 40 abstracts, 23 of which are new entries to the previous edition. GRA

N80-28053 New York Univ., N. Y.

RESPONSE TIME, OPERATOR PRODUCTIVITY AND JOB SATISFACTION Ph.D. Thesis

Raymond Earle Barber 1979 117 p
Avail: Univ. Microfilms Order No. 8014200

The impact is examined of on-line system response time on operator productivity and job satisfaction. A user organization in Cincinnati, Ohio and its five on-line systems provided the environment for the study. The impact of response time on productivity suggests that all or nearly all (e.g., 98%) transactions should be completed in 12 seconds or less. Beyond this level, the user organization suffers severe penalties in lost productivity. When response times are less than six seconds, productivity is relatively flat. That is, the impact of response time on productivity is not as great when average response time is less than six seconds as it is when average response time is greater than six seconds. It is concluded that the normal operating range of the systems studied should be in the four to six second range. It was predicted, prior to the study, that all categories of job satisfaction would be adversely affected by longer response times. The results, however, indicate that response time has a mixed impact on job satisfaction. Some categories showed decreased satisfaction as predicted. Others, however, demonstrated an improvement in job satisfaction as response time increased. These were mainly categories dealing with interpersonal relationships. Based upon the results the implications of response time on system operation and system design are discussed. A method is suggested that would allow the response time models to be applied to other online systems. Desirable directions for future research are discussed in depth. Dissert. Abstr.

N80-28054# Perceptronics, Inc., Woodland Hills, Calif.

A CONCEPT FOR DEVELOPING HUMAN PERFORMANCE SPECIFICATIONS Final Report

Jonathan D. Kaplan and William H. Crooks Aberdeen Proving Ground, Md. Human Eng. Labs. Apr. 1980 47 p refs
(Contract DAAK11-79-C-0115)
(AD-A084617; PTR-2020-80-3; HEL-TM-7-80) Avail: NTIS HC A03/MF A01 CSCL 15/5

OMB Circular A-109 emphasizes the front end of systems acquisition with the intent of (1) expressing needs and program objectives in 'mission' terms rather than 'equipment' terms, and (2) allowing competitive exploration of alternative methods of meeting those needs. For human factors specialists to comply with these requirements, it will be necessary for them to produce explicit specifications for the critical human performance which is required for system performance. This paper presents a concept for producing these required human performance specifications prior to the initial design of a system. It also presents an example of a detailed human performance specification as well as Appendices containing material used to produce human performance specifications for various kinds of systems. GRA

N80-28055# National Bureau of Standards, Washington, D.C. Product Safety Technology Div.

A MATHEMATICAL MODEL FOR USE IN EVALUATING AND DEVELOPING IMPACT TEST METHODS FOR PROTECTIVE HEADGEAR

Robert E. Berger Oct. 1979 79 p
(PB80-164957; NBSIR-80-1987) Avail: NTIS HC A05/MF A01 CSCL 06Q

A lumped parameter mathematical model was developed to connect injury parameters in real life head impact environments to output parameters of test methods for evaluating protective headgear. Analytical/experimental schemes were developed for mathematically representing the parameters that characterize each of the three distinct elements of the model: the head or headform; the impact surface; and the helmet. The model was shown to be useful in determining test method pass/fail criteria which corresponds to the threshold of injury in the real life situation. GRA

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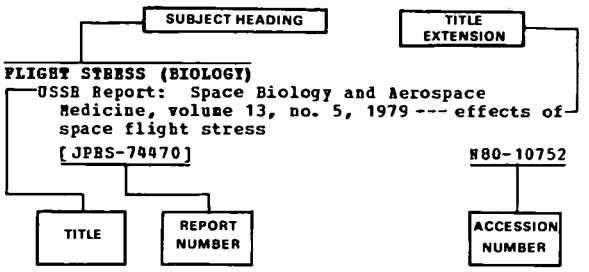

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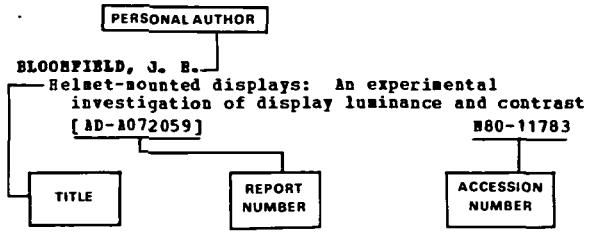

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1. Report No.	2. Government Accession No.	3. Recipient's Catalog No.
NASA SP-7011(211)		

4. Title and Subtitle	5. Report Date
AEROSPACE MEDICINE AND BIOLOGY A Continuing Bibliography (Supplement 211)	October 1980
	6. Performing Organization Code
7. Author(s)	8. Performing Organization Report No.
	10. Work Unit No.
9. Performing Organization Name and Address National Aeronautics and Space Administration Washington, D. C. 20546	11. Contract or Grant No.
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15. Supplementary Notes

16. Abstract

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17. Key Words (Suggested by Author(s))	18. Distribution Statement
Aerospace Medicine Bibliographies Biological Effects	Unclassified - Unlimited

19. Security Classif. (of this report)	20. Security Classif. (of this page)	21. No. of Pages	22. Price*
Unclassified	Unclassified	80	$7.00 HC

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